6.0 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS

The construction and the operation of the proposed TRRC railroad would cause some irreversable impacts to the environment and would commit irretrievably some resources. Land taken for the right-of-way would be irretrievably lost, if it were not reclaimed following the abandonment of the railroad. In addition, any structures that were not relocated before rail line construction would be lost. Land severed by the railroad also would be irretrievably lost, should the right-of-way not be reclaimed following its abandonment. Land acquired for urban expansion would be lost to agricultural uses. Soil lost to erosion would be irretrievable.

The construction of the proposed railroad or its alternatives would remove a small amount of wildlife and wildlife habitat in the study area. If reclamation created habitats different from those habitats disturbed, a net change in available habitat would exist. Habitat losses for aquatic resources also would occur, although they would be minimal. Some habitat alterations, caused by construction, would render a few areas incapable of providing the diversity of the existing aquatic habitat.

If techniques are unavailable or unsuitable for the recovery of data from cultural resources, some irretrievable loss of information from impacted prehistoric and historic sites would occur.

Coal mined in the Tongue River area would be lost permanently as a mineable resource and as a ground water aquifer. This modification of the ground water flow may remove some existing springs and seeps, although they might reappear in different locations following reclamation. The overall impacts of mining would permanently change the area's ground water flow pattern, but mining would not diminish permanently the quantity of water available in the mining area. In addition to the impacts to ground water, mining in the area may affect the existence of currently used stock ponds. Finally, life and property losses would be irretrievable.

7.0 RELATIONSHIP BETWEEN SHORT TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE OF LONG TERM PRODUCTIVITY

The loss of land caused by right-of-way acquisition, by severance, and by the construction of the related mines would exert a long term impact on the project area's agricultural productivity. Land lost to the right-of-way and to severance establishes a long term use of this resource. Land used for mining would not create a long term use, should it be properly reclaimed. Reclaimed areas probably would support adequate vegetation for the first few years following revegetation. However, reclaimed vegetation may be more susceptible to drought than are the native plant communities. During periodic droughts, long term revegetation productivity might be less than the present vegetative productivity.

The construction of the railroad and of the related coal mines, combined with the associated, increased human population, could reduce the long term productivity of the region's wildlife. Adequate reclamation can restore or compensate for these losses, particularly if wildlife management on public and private lands is given a high priority by regulatory agencies.

During the coal mines' operation phase, the area's air shed would receive increased particulates and gaseous emissions. With the establishment and success of adequate reclamation, the subject air quality would return to its pre-mining condition.

The construction of the railroad and its related actions would cause temporary increases in suspended sediment and in turbidity in the project area's streams. However, the suitability of this water for its current uses should not be significantly impacted either on a short term or on a long term basis. Within those mining areas served by the Tongue River Railroad, stock ponds would be removed by mining operations. In addition, ground water levels in the vicinity of the mines would be lowered during the mining phase. Nevertheless, they should recover their pre-mining levels after reclamation activities are completed. The post-mining levels of dissolved solids (TDS) in the ground water are expected to be higher than the levels in the pre-mining ground water. However, the resultant water is expected to be suitable for its current uses. Over a long period of time, the ground water in the mining spoils gradually should return to near-baseline conditions, as the ground water approaches chemical equilibrium with the spoiled material.

The construction and the operation of the TRRC railroad and of the related mines would encourage economic growth in the project area. The region would experience an overall increase in population until the mining phase is completed, at which time the population may decline. During the operation of the railroad and the mines, periodic revenue shortfalls may exist in certain governmental jurisdictions. However, the overall fiscal impact to the region would be positive. The change from an agricultural economic base to an industrial economic base would begin in the mining areas.

APPENDIX A

BACKGROUND ANALYSIS OF THE ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION, REASONABLE ALTERNATIVES, AND RELATED ACTIONS

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APPENDIX A

BACKGROUND ANALYSIS OF THE ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION, REASONABLE ALTERNATIVES, AND RELATED ACTIONS

A1.0 LAND USE

A1.1 PROPOSED ACTION

A1.1.1 Construction

The construction of the proposed rail line including either the Ashland SE Alignment or the Ashland NW Alignment would result in land use impacts attributed to the following factors: (1) the acquisition of the right-of-way; (2) the severance of properties by the right-of-way; (3) the acquisition of borrow sites beyond/adjacent to the right-of-way; (4) the effects of the flow of construction workers on the amount of land needed for various community services; (5) the installation of facilities.

A1.1.1.1 Acquisition of the Right-of-way

The amount of land to be acquired for the right-of-way of the proposed railroad and this land's existing uses are depicted in Table A1-1. Of the required land, 12 percent is owned by the federal government, 1 percent by the State of Montana, and 87 percent by private individuals. Some of the federal land incorporated in the right-of-way is part of the U.S. Department of Agriculture's (USDA) Livestock and Range Research Station (LARRS), located west of Miles City. Much of the remaining federal and state land is leased to private parties for agricultural purposes by the U.S. Bureau of Land Management (BLM). Forty-eight property owners have holdings located within the right-of-way.

The right-of-way for the Ashland NW Alignment would require 70 fewer agricultural acres than would the Ashland SE Alignment. However, an additional 33 acres of land in urban use would be required for the NW Alignment. Eight private individuals and the Province of St. Joseph own property located within the Ashland NW Alignment's right-of-way.

Effects on Agricultural Land

Most of the land to be acquired for the railroad's right-of-way currently is used for agricultural purposes. Approximately 93 percent of the affected agricultural property is grazing land. No prime agri-

TABLE A1-1

LAND USE LOSSES DUE TO THE RIGHT-OF-WAY[a]
PROPOSED ACTION

CURRENT USE	ASHLAND SE ALIGNMENT	ASHLAND NW ALIGNMENT
Irrigated Cropland	37 acres	45 acres
Nonirrigated Cropland	75	58
Grazing Land	1,435	1,374
Other Uses	215	248
TOTAL	1,762 acres	1,725 acres

[a] The amount of land in acres that would be taken for the right-of-way was calculated by parcel. Data on land use by parcel were obtained from rancher interviews and county appraiser records.

cultural land and little irrigated cropland--i.e., 3 percent of the total agricultural land--would be involved in construction of the right-of-way. The remaining affected acreage--nonirrigated cropland--represents 4 percent of the total agricultural land included in right-of-way acquisition. Land removed from agricultural production represents about 0.05 percent of currently used agricultural land in the project area (Custer, Rosebud, and Powder River Counties).

Construction of the proposed rail line also would affect agricultural land use by displacing some capital improvements on ranch properties. Table A1-2 presents the number of existing and proposed capital improvements on ranches that are located wholly or partly within the right-of-way.[1] The construction of the rail line would require either the relocation or the replacement on new sites of these improvements.

TABLE A1-2

DISPLACEMENT OF CAPITAL IMPROVEMENTS ON RANCHES: PROPOSED ACTION

EXISTING IMPROVEMENT	ASHLAND SE ALIGNMENT	ASHLAND NW ALIGNMENT
Buildings	1	2
Corrals/Holding Areas	3	3
Wells/Water Tanks	5	4
Irrigation Systems	2	2
Roads	6	9

Costs associated with the relocation of each ranch improvement would vary. In some cases, the costs to individual ranchers could be significant because corrals, irrigation systems, and roads would be displaced. In one case, a set of corrals used to gather and to disperse cattle among several pastures would be displaced. The relocation of these corrals could result in considerable labor cost increases. It is assumed that the Tongue River Railroad Company (TRRC) would compensate ranchers for relocations. If ranchers are assisted with relocation costs, the removal of these capital improvements should not have long term adverse affects.

Effects on Livestock and Range Research Station Land

The construction of the proposed rail line would traverse approximately 13 miles of the Livestock and Range Research Station near Miles City, Montana. Roughly 149 acres of the research station's land would be acquired for the right-of-way. The proposed right-of-way acreage currently is used as either nonirrigated cropland or grazing land, and is included in the following designated research pastures: (1) Fish Hatchery Site; (2) Hill Pasture; (3) Lower Flood Pasture; (4) Hogback Unit; (5) Tongue River Bend Pasture; (6) 2-C Bend Pasture; (7) No. 3 Pasture. Acquisition of the right-of-way through the LARRS would affect ongoing research in these pastures in various ways.

The proposed alignment would cross the Fish Hatchery Site, which has been used by the BLM for vegetation and soil experiments. Field reconnaissance of this site revealed that it does not appear to be in a pristine condition.[2] The presence of large amounts of annual brome grasses and other invader weedy species indicates that the area has been physically disturbed. BLM personnel confirm that the site has little research value.[3]

The research project in the Hill Pasture that could incur the greatest impact from the railroad concerns the effect of various herbicide treatments on the eradication of annual brome grasses. The proposed alignment would remove a large experimental exclosure and 14 smaller portable exclosures. This experiment was started in 1979 and is scheduled to end in 1984. If the experiment ends on schedule, construction of the railroad should not influence its results. The proposed alignment would have little effect on other experiments in the Hill Pasture because these experiments have been or will be completed by the time the rail line is constructed.

The Hogback Unit supports several experiments that concern the relationship between grazing, forage production, and cultural treatments of rangeland. The rangeland vegetation has been mapped in detail and the reciprocal relationships of range production on livestock growth and vigor and the influence of livestock grazing on vegetation have been documented over a 50-year period. The loss of 10

acres of grazing land to the railroad right-of-way would reduce the carrying capacity of Hogback slightly and may alter grazing patterns. However, because the proposed alignment is proximate to the existing eastern boundary of the Hogback Unit, the influence of the railroad in altering grazing patterns would be lessened.

The impacts of the proposed rail line on the detailed vegetation mapping of the Hogback Unit would be minimal. The vegetation was mapped in extraordinary detail in the 1930s or 1940s. Because plant communities are dynamic entities that respond to climate, grazing, fire, insects, and other factors, it could be expected that the boundaries of many plant communities have changed over the 40-year period that has elapsed since they were originally mapped. Plant community maps prepared 40 years ago probably do not accurately depict boundaries of the vegetation which exist at the current time.

The Lower Flood, 2-C, and No. 3 Pastures are used for cattle breeding and pasturing areas for Line 1 and other cattle involved in long term genetic studies. In addition, various vegetation studies that concern the response of plants to grazing, chemical herbicides, and fire also have been undertaken in these pastures. The construction of the proposed rail line would remove a small amount of acreage from these pastures. However, the alignment is located along an existing fenceline, thereby minimizing the potential disturbance to vegetation enclosures and permanent transects.

Effects on Subdivision Land

The rail line right-of-way with the Ashland SE Alignment would include parts of 12 tracts of the Tranel Subdivision and would cross a street within the subdivision. Located about one-half mile northeast of the Ashland townsite, the subdivision consists of 37 tracts, averaging about 10 acres. None of the 13 residences currently established in the subdivision is located within the proposed right-of-way.

The right-of-way for the Ashland NW Alignment would include parts of ten tracts of the Tranel Subdivision and would cross two streets within the subdivision. One of the 13 residents living in the subdivision is located within the right-of-way. This route also is located near the Snodgrass Trailer Court and crosses the court's access road.

Effects on Recreation Sites

The proposed rail line would intersect parts of the Branum Lake Fishing Access Site near Miles City and, at its closest point, pass 700 feet east of the lake. During the last three years, the lake has not been used for fishing, and the area affected by the right-of-way currently is leased to a private individual for cattle grazing.

Montana Department of Fish, Wildlife and Parks personnel believe that Branum Lake is not suitable for recreational purposes. Department personnel have stated that the site could be re-established. However, they indicated that a new site would be preferable to Branum Lake.[4] The proposed rail line would not adversely affect the use of Branum Lake, given its current status.[5]

Other Impacts

Land belonging to the Miles City Livestock Sales Yard would be acquired for the proposed right-of-way. In addition, two houses would be displaced by the construction of the railroad, one owned by K. and M. Green, occupied and located approximately 1 mile northeast of the St. Labre Mission, and another belonging to the Miles City Livestock Sales Yard, unoccupied and located within its compound. An occupied trailer on the livestock yard property also would be displaced, as would a sewage lagoon in the U.S. Department of the Interior's fish hatchery, located near Miles City.

Two trailers in Sawmill Court would be displaced by the Ashland NW Alignment. An additional trailer would be located along a limit of embankment of the railroad. The remaining two trailers would be located on either side of the right-of-way, since the route bisects the court. Additional urban lots that are bisected by the Ashland NW Alignment include Eastmont Forest Products, Cal-Gas, whose major facilities are located at a limit of proposed rail line embankment, and three private lots. Ashland's lift station, sanitary sewer and its fire station would be bordered on one side by the NW Alignment. It is assumed that the applicant will be responsible for all mitigative measures resulting from either of the two Ashland routes.

A1.1.1.2 Severed Parcels

Effects on Agricultural Land

In addition to the direct use losses resulting from the acquisition of right-of-way land, the rail line also could adversely affect agriculture by severing parcels. Table A1-3 presents the acreage lost to a specified use because parcels are severed and, therefore, experience access restrictions.[6] With the Ashland NW Alignment, 144 fewer acres of agricultural land would be lost because of severed parcels and access restrictions than would be lost with the Ashland SE Alignment.

Forty-eight property owners (of whom 39 own parcels in agricultural use), hold parcels that would be severed by the proposed rail line. Severance could restrict cattle movements, disrupt rancher access to parcels, or displace irrigation systems. The impact of severance on ranching operations was determined through a parcel-by-parcel examination of each ranch, as illustrated in Figure A1-1.

TABLE A1-3

LOSS OF LAND USE DUE TO ACCESS RESTRICTIONS AND PARCEL SIZE REDUCTION
PROPOSED ACTION

CURRENT LAND USE	ASHLAND SE ALIGNMENT	ASHLAND NW ALIGNMENT
Irrigated Cropland	44	44
Nonirrigated Cropland	88	85
Grazing Land	930	789
TOTAL	1,062	918

Restricted Cattle Movement

The TRRC has agreed to construct cattle passes under the rail line at places where ranchers would move their cattle from one pasture to another. Despite the presence of these cattle passes, some livestock might be reluctant to trail through them--particularly if the passes are used infrequently. The experience of ranchers who are located along rail lines similar to the proposed railroad is that cattle easily move through underpasses, if they are used frequently.[7] Although calves initially will be reluctant to use the cattle passes, the reluctance would diminish with the frequency of use.[8]

Cattle passes that are used infrequently might require increases in time and in labor to herd cattle between pastures. Should such cattle transfer become a problem, holding pens could be constructed on either side of the underpass to contain the cattle. Prevented from scattering, the cattle eventually would proceed through the underpass to the alternate pen or pasture.

Loss of Direct Access

The construction of the proposed rail line might limit access to agricultural land by reducing the number of available access routes. The TRRC has agreed to construct crossings at the rail line's intersection with public and private roads.[9] Thus, access restrictions would be minimal, unless current ranching operations experience significant change. In a few cases, rail line construction would require road relocation, because the road is located within the proposed right-of-way. In one instance, that road relocation would be constrained by topography. The new road would be moved several hundred yards from its current location and would add more than 1 mile to the rancher's trip between the parts of his ranch. The TRRC has agreed to undertake the necessary road relocation in consultation with the affected ranchers.

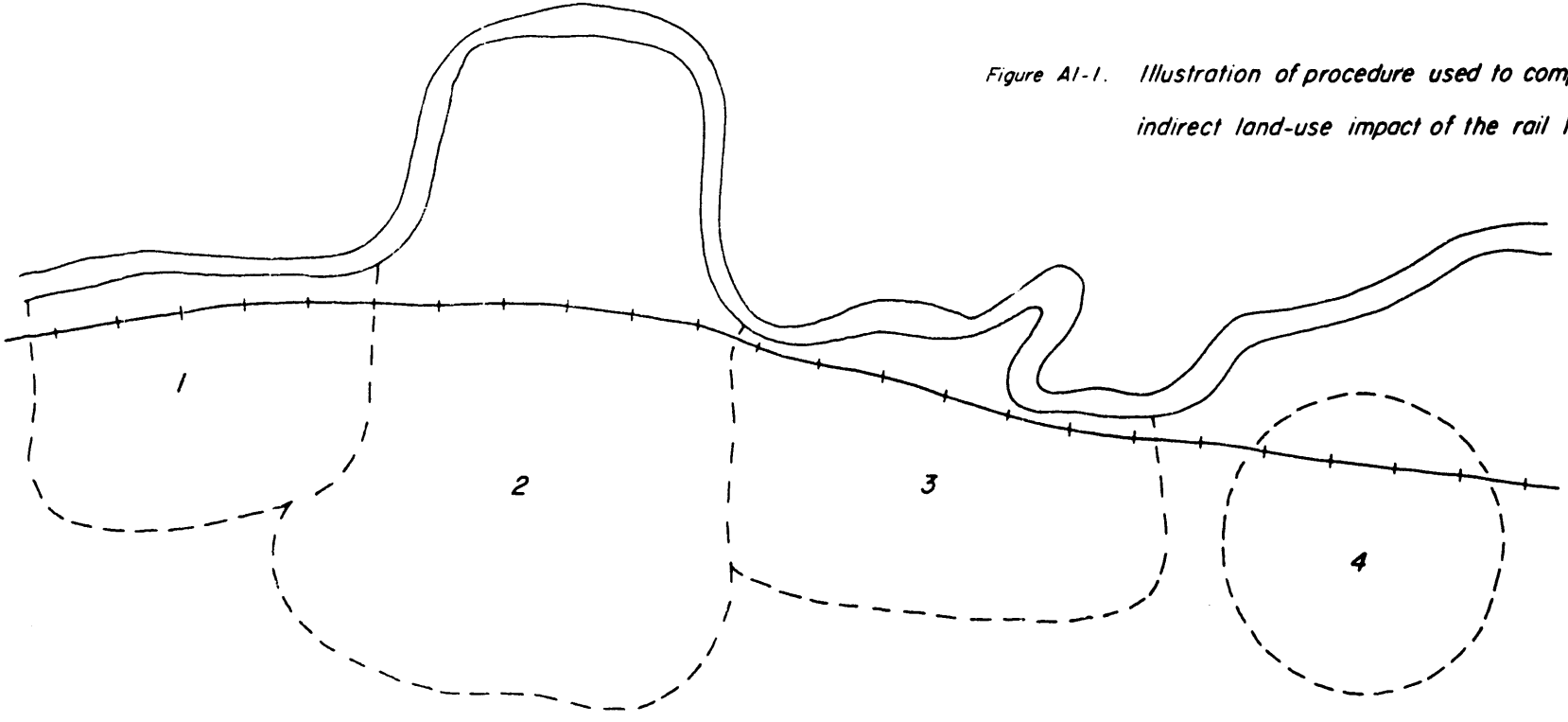

Figure A1-1. Illustration of procedure used to compute the indirect land-use impact of the rail line.

1. Cropland. Rail line results in division of the parcel--20 acres north, 150 acres south. Northern parcel is too small to continue cultivation.

2. Pasture. Rail line results in division of pasture (150 acres north, 250 acres south). Cattle pass will allow continued use of both portions.

3. Cropland. Rail line divides parcel into a 30-acre (north) and 200-acre (south) plots. The irregular shape of the northern plot would preclude continued cultivation despite the 30-acre size.

4. Pivot sprinkler (160 acres). Rail line divides the area into two plots, 140 acres and 20 acres. While it would be likely to continue irrigating part of the 140-acre plot by adjustment of the pivot, it is assumed, for "worst case" impact analysis, that the whole system is displaced.

Displacement of Irrigation Systems

Construction of the proposed rail line would displace mechanical irrigation systems and gravity flow irrigation systems (ponds and ditches) in a few locations. Without mitigation, this displacement of irrigation systems would result in reduced crop yield. Since, within the project area, the average yield of irrigated cropland is several times that of nonirrigated cropland, this yield reduction would directly affect rancher income.

Using the data base pertinent to ranching operations and rail line characteristics, the irrigation systems that might be displaced were identified and examined to determine if the effect of displacement could be mitigated.[10] Gravity flow irrigation systems can be mitigated more easily than can mechanical systems, since the former can be rerouted by altering ditches and by installing culverts. It is assumed that these measures would be pursued by the TRRC. In addition, construction of the proposed rail line would disrupt a 13-acre irrigation pond, one-quarter of which would fall within the right-of-way. However, it is assumed that this loss in water storage capacity could be compensated by reshaping the pond somewhat and by dredging it to a greater depth.

Impacts to mechanically irrigated land are more difficult to mitigate than are those impacts to gravity flow systems. Right-of-way construction could render the continued use of mechanically irrigated land less economically viable by altering the size and shape of the parcel, by requiring a change in the type of irrigation employed, or by increasing the distance of the dispersal system from its water source. If the continued irrigation of the parcel is practical, the rancher would incur costs to change the irrigation system, in addition to the income loss he would incur from a reduction in the size of the irrigated parcel. To quantify the impact to specific mechanically irrigated parcels, a "worst case" method of analysis was employed. Any encroachment by the proposed rail line on an existing or planned mechanical irrigation system was assumed to cause total system displacement. Thus the estimated loss in agricultural productivity associated with this disruption represents a maximum impact figure, which does not include the salvage value of the equipment, and is likely to overstate the impact in some cases.

Table A1-4 presents the number of current irrigation systems that would be displaced and the acreage associated with them for the proposed rail line with either Ashland alignment. The analysis reveals that some irrigation systems would be displaced and that potential losses could be reduced by relocating existing mechanical systems. Additional estimated losses would be reduced further if the land currently irrigated is maintained as nonirrigated cropland or as grazing land.

TABLE A1-4

POTENTIAL DISPLACEMENT OF CURRENT AND PLANNED IRRIGATION SYSTEMS
PROPOSED ACTION

Number of Existing Systems Disrupted	8
Number of Existing Systems Displaced[a]	2
Number of Planned Systems Disrupted	3
Acreage Associated with Displaced Systems:	
Existing	255
Planned	160
Total	415
Productivity Loss ($/year)[b]	$ 74,700
Investment Loss ($)[c]	$178,500

[a] Systems displaced are fewer than systems disrupted because mitigative measures can restore the full capability of some systems.

[b] Productivity loss is based on the average yield per acre of irrigated land in 1979 of $180/acre. Average yield per acre is based on data from Montana Agriculture Statistics, Vol. XVIII, County Statistics 1978 and 1979, Montana Department of Agriculture and Montana Crop and Livestock Reporting Service, Helena, Montana, December 1980, p. 23.

[c] Investment loss includes only the cost of new irrigation equipment. Land preparation costs and equipment salvage value are not included in the calculation. The following equipment costs were assumed: Pivot sprinkler--$700/acre, Other system--$300/acre (Steve Vick, Hinebauch's Complete Irrigation, Inc., Glendive, Montana, personal communication, March 24, 1981).

Other Impacts to Agriculture Associated with Construction of the Proposed Rail Line

The effects on ranching operations attributable to the construction of the proposed rail line could be similar to those rail line impacts experienced by ranchers during the construction of the Sarpy Creek and of the Gillette/Orin lines. A list of potential problems was developed from interviews with ranchers owning property near these two other railroads:

(1) Litter (6%)
(2) Poor fence installation (35%)
(3) Trespassers, no damage (18%)
(4) Trespassers, theft, and property damage (18%)
(5) Dust (24%)
(6) Gates left open (29%)

(7) Temporary access restriction (24%)
(8) Broken water and gas line (6%)
(9) Irrigation system disruption (6%)
(10) Road damage (6%)
(11) Temporary water cutoff (6%)

Since the major problems encountered by ranchers involve fencing and gates, the timely construction of durable fencing would avoid problems with cattle straying from their pastures. Temporary alternative access routes could be established during construction to avoid the disruption of ranching operations. The disruption of irrigation systems could be avoided by proper planning. At least, this disruption could be minimized with the appropriate timing of construction activities.

Effect on Agricultural Productivity

Construction of the proposed rail line would impact 39 ranchers along the alignment. This total represents 4 percent of the agriculturalists in the project area. Sixty-nine percent of the ranchers affected by the rail line would experience land use losses or restriction involving less than 2.5 percent of their deeded land. Five percent could experience losses or restriction affecting more than 10 percent of their deeded land (see Table A1-5). Since most area ranchers rely on a combination of deeded land and leased land for their operations, these figures may exaggerate the potential impact.

TABLE A1-5

DISTRIBUTION OF IMPACT BY PERCENT OF RANCHERS' LAND REMOVED FROM PRODUCTION: PROPOSED ACTION[a]

PERCENTAGE OF RANCH LAND REMOVED FROM PRODUCTION	NUMBER OF RANCHERS ASHLAND SE ALIGNMENT	ASHLAND NW ALIGNMENT
Less than 1	18	20
1.1 - 2.5	9	9
2.6 - 5.0	5	5
5.1 - 7.5	3	3
7.6 - 10.1	2	2
10.2 - 12.5	1	1
12.6 - 15.0	1	1
Greater than 15	-0-	-0-
TOTAL NUMBER OF RANCHERS	39	41

[a] Based on deeded acres only

Construction of the proposed rail line with the Ashland SE Alignment would remove approximately 3,024 acres from agricultural production (due to right-of-way acquisition and severance). The monetary loss would approximate a total of $3.4 million for the period 1985-2011 (see Table A1-6). The total monetary loss would be 0.16 percent of the agricultural production value for the project area. Construction of the Ashland NW Alignment would remove 70 less acres (due to right-of-way acquisition and severance) from agricultural production. The total monetary loss would reduce the impact of the proposed railroad on agriculture by about $66,000 (see Table A1-6).

TABLE A1-6

PRODUCTION LOSS DUE TO RIGHT-OF-WAY ACQUISITION AND PROPERTY SEVERANCE
PROPOSED ACTION

PRODUCTION LOSS	ASHLAND SE ALIGNMENT	ASHLAND NW ALIGNMENT
Cumulative Cattle	$ 723	$ 656
Production Crops	2,718	2,719
Loss Total ($000s)[a]	$3,441	$3,375
Percentage of Project Area Production[b]		0.16%

[a] Value of production rates (Montana Department of Agriculture, et al., Montana Agriculture Statistics): Irrigated cropland, $180/acre; Nonirrigated cropland, $70/acre; Grazing land, 45 acres/cow-calf unit, $510/animal

[b] Cash receipts from marketing (1979): $80,464,400 (Montana Department of Agriculture, et al., Montana Agriculture Statistics)

Effects on Livestock and Range Research Station Land

The construction of the proposed rail line would sever parcels of land in a number of research pastures on the Livestock and Range Research Station near Miles City. Portions of a winter-calving pasture near Interstate 94, the Hill Pasture, Lower Flood, Tongue River Bend, 2-C Bend, and No. 3 Pastures would be affected by the project.

The construction of the rail line would restrict the movement of equipment and livestock between pastures. In addition, it would displace a road providing access to the Lower Flood Pasture. The rail line also would disrupt access to wells currently used to water livestock and to at least one water pipeline. Finally, the construction of the rail line through the Flood Pasture would disrupt operation of a dike system in that pasture.

The Tongue River Railroad Company has agreed to construct at-grade crossings and grade-separated crossings in sufficient numbers to allow vehicles and livestock to reach the various affected pastures. Vehicle crossings would be of sufficient size (18 feet by 4 inches span and 16-feet 11-inch rise) to allow vehicles to pass through them. In addition, the TRRC has agreed to relocate a road east of the rail line in the Lower Flood Pasture, thereby providing sufficient access to that area. Finally, the TRRC has agreed to install new wells and to replace the disrupted pipeline in the various affected pastures, thereby mitigating the disruption of the water source. Additional wells could be drilled in the pastures where livestock would otherwise have difficulty obtaining water. The installation of culverts in the Lower Flood Pasture in sufficient number to allow the passage of water would effectively mitigate impacts of the rail line to the dike system.

Effects on Subdivision Land

The proposed rail line would cross the Tranel Subdivision located north of Ashland. A number of tracts would be severed by the rail line and could be rendered unusable. However, since most tract boundaries could be readjusted, it is assumed that there would be no parcel loss of subdivision land due to severance. The exception to this assumption would be in the case of the Ashland NW Alignment, where two tracts are severed twice by the rail line. In this instance, portions of those tracts would be lost to subdivision use.

Effects on Recreation Sites

The proposed rail line would cross parts of Branum Lake Fishing Access Site. The Branum Lake site is not currently used for recreational purposes and no land would be lost to severance.

Other Impacts

The proposed rail line would intersect the Miles City Livestock Sales Yard and would sever that area. Portions of the yard would be rendered unusable as a result of severance.

Construction of the proposed rail line with the Ashland NW Alignment would sever parcels of urban land in that community. One trailer court and one industrial site would be severed by the rail line and would have to be relocated. A sawmill plant site would be severed. However, with the relocation of one office building, the site's function would not be impaired. Access to one trailer court in Ashland would be disrupted by the Ashland NW Alignment. However, the establishment of a new access road to the court, which the TRRC will construct, would mitigate impacts to the trailer court.

A1.1.1.3 Acquisition of Borrow Sites

It is expected that much of the sub-ballast material required for the railroad grade would be extracted from cuts. However, the rail line from Miles City to a point 20 miles south of Miles City would require imported sub-ballast. Approximately 90,000 cubic yards of sub-ballast would be obtained from existing borrow pits within the Yellowstone River Valley.

Three or four new borrow pits, each 5 acres in size, may be required to obtain additional, necessary sub-ballast material. Since the sites of these borrow pits have not been identified, the uses of the land on which they would be located are not currently known. These lands would be impacted in the short term, while borrow material was being extracted. Long term impacts would be negligible, since the borrow pits would be reclaimed.

With the Ashland NW Alignment, additional sub-ballast material would have to be obtained because the route has no cut equivalent to a 170-foot cut that would provide the majority of the required sub-ballast material with the Ashland SE Alignment. The number of new borrow sites would not increase with construction of the former alignment. However, more material would have to be extracted from each new site.

Ballast material also would be imported from outside the project area, probably from existing borrow pits either in northern Wyoming or in South Dakota. Since ballast will come from existing borrow pits, changes in land use in these areas are not expected.

A1.1.1.4 Effects of Construction Workers on Land Use

The construction of the proposed rail line to Terminal Point #1 would begin in 1985 and would terminate in late 1986 or early 1987. An average of 250 workers would be employed by the contractors during the 2.5 construction seasons. During peak construction operations, between 540 and 570 people will be involved in the project. Construction of the proposed rail line to Terminal Point #2 would begin in 1988 and end in 1989. It would employ an average of 25 persons per month, with a peak employment of between 50 and 70 persons.[11]

Local area residents would comprise approximately 40 percent of the work force and would not contribute to land use impacts. Nonlocal workers would comprise the remaining 60 percent of the work force. Some nonlocal workers would undoubtedly reside in Miles City. However, the TRRC plans to house nonlocal workers in five construction camps, each 40 acres in size. The camps would serve as staging areas and materials depots, as well as provide space for self-contained camping trailers. As yet, the locations for the camps have not been selected. However, these 200 acres of land would be selected from lands currently used for agricultural purposes, most likely grazing. Since the camps would be temporary and would not require the construc-

tion of extensive facilities for sewage and water, they should exert no long term impact on current land use. The 200 acres would be reclaimed following the completion of the project.

Land also would be required for the additional population attracted to the project area as a result of rail line construction. This induced population, projected at about 260 people annually from 1985 through 1987 and 30 people annually for the period 1988 to 1989, would require 110 acres of land for residential and associated purposes. Since this population would be primarily involved in support service activities, Miles City, Forsyth, and Colstrip probably would be their locations. Some of the land required to provide for the impact population currently may be used for urban rather than agricultural purposes.

A1.1.1.5 Acquisition of Facilities Areas

The TRRC proposes to rehabilitate and to use the abandoned Milwaukee Road railroad facility at Miles City as an interchange yard. The rehabilitation of this facility neither would require new land nor would change current land use at the site. Should these yards not be available to the TRRC, a new facility would be constructed. A possible location for this facility exists either 4 miles east of Miles City or southwest of that community near the Burlington Northern tracks. The new yard would require the purchase of approximately 60 acres of land now used for agricultural purposes.

In addition to the Miles City interchange facility, the TRRC would require a maintenance of way/signal and communication shop at Ashland. This facility would be located on a 2-acre urban site in Ashland.

A1.1.1.6 Mitigative Measures

The implementation of certain measures could mitigate to a large extent the land use impacts associated with the construction of the proposed rail line. The TRRC has agreed to undertake the following types of mitigative actions.

(1) The provision of grade-separated crossings--corrugated steel tube underpasses primarily--at siding locations;
(2) The provision of crossings consistent, in terms of number and size, with ranching requirements;
(3) The proper installation and maintenance of durable fencing and gates;
(4) The construction of holding pens at those cattle passes which are used infrequently and which present a problem to livestock;
(5) The design of cattle passes to minimize the reluctance of cattle to use them;
(6) The relocation of private roads to avoid multiple rail line crossings;
(7) The relocation of displaced capital improvements.

A1.1.2 Operation and Maintenance

The operation and maintenance of the proposed railroad also would contribute to land use impacts. These impacts are associated primarily with the interference with access to property because of train blockage of grade crossings, and the reduction in desirability of property adjoining the rail line.

The effects of TRRC trains on accessibility and desirability of land along the Burlington Northern (BN) line within the project area are discussed in the Transportation section of this appendix (see section A3.0). Overall, however, the magnitude of impact on agricultural property along these lines may be somewhat smaller than that projected for property along the TRRC line. The significant difference is that the BN lines have crossings already in place.

A1.1.2.1 Effects on Agricultural Operations

Interference with Access

Ranchers express concern that the railroad's crossing of their access roads may delay and disrupt ranching operations. The probability of delay and the duration of that delay for ranchers wanting to cross the rail line would be small. At the peak of the TRRC's operations, in 2011, 19 to 25 trains per day might be operating. The probability of delay at a crossing would be 4 to 6 percent: in 100 crossings, a rancher would experience 4 to 6 delays.[12] Using calculations based on a normal train speed of 38 mph, the average duration of delay would be 1.4 minutes. This delay might cause some inconvenience, but it should not disrupt ranching operations--except where ranchers use access roads that criss-cross the right-of-way, or where ranchers rely on access roads that cross railroad sidings.

In the former case, the frequency of delay experienced would be somewhat higher than in the single-crossing case. For the estimated 10 percent of the ranchers who would experience this problem, assistance in road relocation would mitigate the impact. In the latter case, the expected probability of delay at siding crossings would be small in the early years of operation, but would increase with the train volume. By 2001, the probability of delay would range from 35 to 40 percent. The average delay at these crossings in 2011 would be about 13 minutes. This amount of delay could be experienced along 15 percent of the proposed railroad's mileage and is sufficiently large to warrant grade-separated crossings at the affected sidings.[13]

Adequate crossings and the size and design of underpasses would be factors in mitigating the impact of the operation of the railroad. Both crossings-at-grade and grade-separated crossings that are too small to accomodate ranch machinery could cause inefficiencies in ranching operations. Undersized crossings would not become a problem if ranchers can define their requirements and the TRRC assists in

meeting those needs. The proper design of cattle passes would reduce the potential difficulties in herding cattle through them. For instance, large and open structures, with a guided or tapered approach, are preferred by most ranchers.

Reduction in Desirability of Ranching Property

Not only would the loss of land for ranching render ranch property less attractive, but also restrictions on the use of land, management problems, and inconveniences associated with a rail line could render that property less desirable. Most ranchers who own property adjacent to other rail lines report that the railroad does exert an adverse effect on property values. At the same time, they have witnessed little, if any, discernable reduction of their own property value.[14]

The operation of the proposed railroad might reduce ranch equipment accessibility to some land parcels, and overall ranch efficiency. However, the implementation of appropriate mitigative measures, discussed in previous sections, would reduce these impacts. In general, the railroad operations would cause ranchers inconvenience, but they neither would disrupt basic ranching operations nor would reduce significantly overall ranch productivity.

Other Impacts: Fires

Fires present another concern for ranchers, although the occurrence of these fires is difficult to predict. The locations where fires are most likely to occur are: (1) areas where locomotives accelerate; (2) sidings; (3) mainlines where the grade changes from a decline to a steep incline. The experience of other ranchers indicates that the frequency of fires and the per fire extent of damage would not be high. For instance, along the Sarpy Creek line, one fire for every 170,000 train miles was reported. Along the Gillette/Orin line, one fire per 67,000 to 134,000 train miles was reported. Grass fires along the Burlington Northern line in Custer County normally occur at a rate of one fire per 65,000 train miles.[15]

If the Tongue River Railroad Company's railroad experience is similar to the experience along other rail lines, losses resulting from railroad-caused grass fires would be small. The frequency of grass fires along the TRRC's right-of-way would vary from two to five fires annually through 2011. These fires would range in size from negligible to 5 acres. Thus, about 10 acres of land could be damaged annually by train-caused grass fires.[16] Fire frequency and fire damage depend upon preventive measures taken by the railroad--e.g., vegetation control, right-of-way surveillance, and the establishment of fire control units. The TRRC has agreed to take the necessary measures to reduce the frequency of railroad-related fires.

Other Impacts: Coal Dust

Coal dust that is blown from open hopper cars presents a concern

to some ranchers. The extent of this problem is unknown, since little research has been conducted concerning the subject. However, most researchers contend that coal lost in transit amounts to less than 1 percent of the shipment.[17] The Montana Air Quality Bureau has stated that airborne coal dust would not cause a significant problem, since most of that coal would be lost during the first few miles' transportation from the loading site.[18] Any coal dust that is lost during transit is likely to settle in the right-of-way and should, therefore, not affect agricultural land.

Other Impacts: Access and Trespassing

Unauthorized access to ranches might be facilitated by the construction of the proposed right-of-way. The experience of ranchers who own property along recently built rail lines indicates that trespassing is a problem principally during the construction phase.[19] Trespass should not cause a long term problem.

The concern that the disturbed land in the right-of-way could encourage weed propagation has been expressed by ranchers. Weeds can reduce crop yields, can introduce undesirable plant species into pastures, and can increase the fire hazard. With proper maintenance, weed growth within the right-of-way can be controlled. Care must be used, however, to ensure that the control measures are not damaging to adjacent land.

The concern that livestock would enter the right-of-way and would be hit by trains can be reduced by containing animals through the installation and maintenance of durable fencing materials.[20] The installation of cattle guards on both sides of each grade crossing also would serve to mitigate the possibility of livestock being struck by trains. As noted earlier, the TRRC has agreed to construct the necessary grade crossings and cattle guards.

A1.1.2.2 Effects on Livestock and Range Research Station

Interference with Access

The U.S. Department of Agriculture's Livestock and Range Research Station (LARRS) operations could be disrupted by delays to vehicles within the LARRS. In the "worst case" situation--i.e., the high coal production scenario in 2011--the probability of delay along the line is expected to approximate 4.1 percent, with an average duration of delay of 1.4 minutes. The proposed crossing of the Burlington Northern mainline on the LARRS would be grade separated, and thus would serve to reduce crossing delays on the station.

Other Impacts

The operation and maintenance of the proposed railroad through the LARRS would impact the station in a number of ways. A general impact would be to the historic use of LARRS as a research facility in which

the total environment has been considered and factored into the experimental design and data interpretation. A number of research projects being conducted at the station rely on the data base that has been collected over a period of many years. These long term projects have closely measured environmental variables and have been able to statistically account for experimental results which are attributable to specific variables, such as seasonal precipitation, pasture-stocking rate, and genetic composition of the experimental livestock. The capacity to account for experimental variables in data interpretation is essential to any research project.

The proximity of the railroad to the Nursery site will have little, if any, effect on the cultivation of plant species. However, it may affect the desirability of the site for testing livestock forage preferences. As livestock are used in the experiments, it is possible that noise from passing trains may influence spatial selections of certain areas of the pasture. Such an effect could bias the results of the experiment. The extent of the impact from TRRC trains on livestock experiments at the Nursery site is difficult to determine. The existing Burlington Northern Railroad, south of the Nursery, could be expected to influence experimental results in that site. Apparently, it has been assumed that the BN railroad does not render the site unacceptable due to the fact that the railroad existed before the experiments were initiated. It may be that the livestock become accustomed to disturbance from trains, thereby reducing the potential for experimental bias.

Another possible impact to the Nursery site could result from the location of the rail line approximately 150 feet east of the Nursery boundary. With a 30-foot embankment, it could be expected that increased snow would accumulate within 450 feet upwind of the fill. Other microclimatological changes, such as reduced wind speed, evapotranspiration, and dessication, also could be expected to occur within 450 feet of the barrier. Snow accumulation, due to the 30-foot embankment, could be mitigated by judicious placement of snow fences upwind from the Nursery site. The effects of reduced wind speed and evapotranspiration would remain.[21]

Another example of possible general affects of the railroad on the experiments and data from LARRS research plots is on the Hogback Unit. The proposed rail line will remove a small portion (10 of 1,100 acres) of this unit from use. The average carrying capacity unit would be reduced by a small amount and grazing patterns may change. The primary affect, however, will be that the railroad introduces an uncontrolled variable into the research projects being conducted. Research on the Hogback Unit has been designed so that environmental variables, such as precipitation, stocking rate, and animal genetic composition can be factored into data interpretation.

Construction of the railroad generally will superimpose a new environmental variable on top of a well-documented data base. After construction of the railroad, all data collected will have to be care-

fully studied to determine whether observed experimental affects are due to experimental treatments or to construction and operation of the railroad. This general impact on experimentation will occur to some extent on all research closely linked to the historic data base interpretation.

It could be suggested that because the existing data base is so extensive and because existing environmental variables can be accounted for, the LARRS would be the perfect location for studying the effects of a railroad on livestock production. By designing experiments for the railroad as the experimental variable, effects of the railroad could be accurately determined. The results of such experimentation would have application to ranching operations on the Northern Great Plains. The science of impact prediction also would benefit from controlled experiment because impacts could be very precisely measured.

Other impacts to specific research areas on LARRS might include effects of coal dust on experiments at the Nursery site. Scientists at the Montana Department of State Lands have stated there is no data available on the amounts of coal dust that may blow off railroad cars in transit or on the possible effects of the coal dust from trains on vegetation, wildlife, and livestock. However, as noted in section A1.2.1, the amount of coal dust lost during shipment is expected to be minimal. Consequently, significant impacts to the Nursery site from coal dust are unlikely.

Another possible impact from the railroad would be to genetic experiments conducted in the Lower Flood, No. 3, and 2-C Bend pastures. The impact of the railroad would be to complicate the interpretation of genetic data. The railroad could influence reproductive rates and success simply by the physical intrusion and presence of trains. The frequent rotation of livestock as is now done in these three pastures would help, somewhat, to mitigate the effects of railroad operation.

The operation of the proposed railroad also could affect the LARRS in other ways. Fire may remove available forage and, depending on the intensity of the fire and the intolerance of individual species to fire in the sectional stage of the plant community, species composition may change in burned areas.

Another impact would be from construction activities that created exposed cut-and-fill slopes that would provide suitable habitat for noxious plants. The species may spread to adjacent areas. Competitive noxious plants tend to replace more desirable native species, resulting in lower carrying capacity. If herbicides were used to control the spread of noxious plants, they also could impact experiments adjacent to the right-of-way.

Finally, the operation of trains through the LARRS could pose a danger to livestock. Two methods to reduce the possibility of livestock injury would be adequate right-of-way fencing and maintenance,

and reducing the speed of trains through the research station. In regard to the latter point, trains would be slowing down as they approach Miles City and would, therefore, reduce the danger to livestock. The problems of access and trespass have been previously discussed and also could affect the LARRS to varying degrees.

A1.1.2.3 Effects on Recreation Areas and Subdivisions

Interference with Access

The Spotted Eagle Lake Recreation Area, located west of Miles City on BLM property, provides boating, water skiing, swimming, fishing, horseback-riding and hiking trails, archery, and trap shooting. It is an important local recreation area. In the period of May through September, 1980, over 7,000 paid vehicles were recorded, indicating high patronage. The proposed rail line would be located adjacent to Spotted Eagle Lake, about 200 feet west of the area's boundary. Although the rail line would not cross the primary access road to the recreation area, the Burlington Northern mainline, on which westbound TRRC trains would be routed, does cross that access road. In 1991, the percentage of trips delayed due to Tongue River Railroad Company trains would be less than 1 percent; by 2011, the delay percentage would be roughly 4.7 percent (see Table A3-1).

The Branum Lake Fishing Access Site, located northwest of the Spotted Eagle Lake Recreation Area and adjacent to the Burlington Northern mainline, has not been used since 1978 for its intended purpose as a fishing lake. The proposed rail line would pass through part of the Fishing Access Site, 700 feet east of the lake at its closest point. It would cross an access road east of the site. This area is currently leased to a private individual for cattle grazing. Since this fishing site is not now being used for its intended purpose, delays caused by TRRC trains would not constitute a problem. Further, this site can be reached by road from the west, which would avoid delays.

The proposed rail line with the Ashland SE Alignment would pass through the Tranel Subdivision, one-half mile east of Ashland, and beside the Trusler Subdivision, on the Otter Creek Road. The effect of the railroad on access to the Tranel Subdivision would be one of inconvenience. The probability of delay would approximate 1 percent in 1991 and 4 percent in 2011. The Ashland NW Alignment also would pass through the Tranel Subdivision, causing accessibility problems at the two locations it crosses roads in the subdivision. In addition, this alignment would interfere with access to the Snodgrass Trailer Court (assuming the crossing is not grade separated). A new access road south of the trailer court would have to be constructed. The Ashland NW Alignment would disrupt Sawmill Court in that the court would be divided by the route and several trailers displaced.

The Trusler Subdivision would be affected less severely because the rail line would pass adjacent to the property rather than through

it. The subdivision also is located on a bluff 120 feet above the rail line. Access to the subdivision would not be affected by the rail line, and all of the proposed rail/highway crossings in the area would be grade separated.

Other Impacts

Operation and maintenance of the proposed railroad could affect the land uses of recreation areas and subdivisions by contributing to aesthetic and noise disruption. Potential operational impacts of the rail line on the Spotted Eagle Recreation Area include noise and visual disturbance and wildlife disruption. Although the recreation area would fall within the 55-decibel noise contour generated by TRRC trains, the railroad noise would not add appreciably to existing noise levels on the site.[22] Because the location of the recreation area is 800 feet south of the Burlington Northern mainline and because of the character and the intensity of the existing use, the patrons of Spotted Eagle already are exposed to relatively high noise levels.

The Branum Lake Fishing Access Site would experience only minor impacts from noise disturbance. The current noise level environment would not be changed appreciably because the Burlington Northern mainline already is located parallel to the property, 500 feet closer than is the proposed railroad.

The proposed rail line with the Ashland SE Alignment would pass through the Tranel Subdivision, one-half mile east of Ashland, and beside the Trusler Subdivision, on the Otter Creek Road. The 13 residences in the Tranel Subdivision would not be displaced by the right-of-way, but their occupants would experience increased noise levels, since all of the residences would fall within the 55- to 70-decibel noise contour.

The Trusler Subdivision includes not only a development located on a bluff 120 feet above the rail line but also a trailer park to be located adjacent to the subdivision, but not on the bluff. The trailer park would be protected partially from the rail line by the terrain, by trees, and by other vegetation. The rail line would be visible from about one-third of the area being developed. Because the trailer park and the subdivision would be within the 55-decibel noise contour, outside activities would be disrupted somewhat for their residents. The establishment of tree buffers is one method of partially mitigating the noise and visual impacts.

The Ashland NW Alignment also could affect land uses of the Tranel Subdivision by contributing to aesthetic and noise disruption. In addition, the Sawmill Court would experience considerable noise disruption, whereas the Snodgrass Trailer Court would be exposed to minor levels of noise.

A1.1.3 Operations Downline

A1.1.3.1 Railroad Capacity and Effects on Facility Requirements

The assessment of land use requirements downline from the Tongue River Railroad Company's proposed railroad is a function of three factors: (1) an identification of the downline corridors; (2) an evaluation of current capacity; (3) an estimate of future train traffic. Downline corridors east and west of Miles City were identified using the methodology presented in the Transportation discussion (see section A3.1.3 and Figure A3-2). Table A1-7 presents current downline capacity data by line segment and by projected peak train volumes in 1991 and 2011.

Typically, if a rail line exceeds 30 percent of capacity, as measured by peak average daily train traffic (ADTT) divided by capacity, additional signalization--i.e., centralized train control (CTC)--is required. After reaching 100 percent of capacity, additional sidings and double tracking are required.

TABLE A1-7

DOWNLINE RAIL CAPACITY AND PROJECTED CAPACITY DEMAND IN TRAINS PER DAY

BURLINGTON NORTHERN SEGMENT	CURRENT (1980) CAPACITY[a]	PROJECTED PEAK ADTT[b]		PEAK ADTT/ CAPACITY	
		1991	2011	1991	2011
WEST					
Miles City/Livingston	35	20	44	0.57	1.26
Livingston/Helena	30	30	65	1.00	2.17
Helena/Missoula	29	34	70	1.17	2.41
Missoula/Sandpoint	28	26	49	0.92	1.18
Sandpoint/Spokane	64	61	90	0.98	1.41
EAST					
Miles City/Terry	38	30	58	0.78	1.53
Terry/Casselton	32	30	56	0.93	1.75
Casselton/Staples	69	49	78	0.71	1.13
Staples/Superior	30	10	17	0.33	0.57
Staples/Twin Cities	69	47	68	0.69	0.99
Casselton/Twin Cities	31	14	25	0.45	0.81

[a] Source: Peat, Marwick, Mitchell, and Company, Washington, D.C., July 28, 1981.

[b] Peak ADTT = projected ADTT from Table A3-7 plus 20 percent.

Based upon these criteria and upon the data presented in Table A1-7, some downline segments will require capital improvements to accommodate the train volumes projected for 1991. Most of these segments are located west of Miles City. By 2011, all but three downline segments will require capacity additions. Most of the segments will require additional siding and double track mainline installations. Table A1-8 provides more detailed estimates of the capital improvement requirements in terms of track miles.

The addition of a second mainline and sidings could directly affect land use in downline communities. This impact could occur if additional railroad right-of-way was required to provide room for sidings or for a second mainline. The need for additional right-of-way, however, is highly unlikely. Double track mainline requires a minimum of 14 feet between centerlines; the spacing of sidings from the mainlines is similar.[23] These land area requirements readily can be satisfied within the typical 200- to 400-foot right-of-way in downline communities.[24] Thus, no expectation exists for the displacement of downline community structures or facilities as a result of rail capacity expansion to accomodate TRRC trains. The effects of changing downline traffic patterns on access to property and the desirability of property are discussed in section A3.1.3.

A1.1.4 Related Actions

A1.1.4.1 Land Required for Mines

The proposed TRRC project would serve an estimated five mines in the Ashland/Otter Creek area. These mining developments include the Montco Mine, which is the only proposed facility as yet to submit an application to the Montana Department of State Lands (DSL) (see Appendix C). The location, the probable production, the development schedule, and the affected acreage for each of the five mines were drawn from the Montco application, from the BLM tract profiles for 1982 coal leases, and from an analysis of company surface and coal holdings in the area.[25] The acreage disturbance in the reclamation schedule reflects the data provided in the Montco application. Based upon these data and upon other information, the following assumptions were made.

(1) Land used for mining would be reclaimed. Mining, therefore, would constitute a short-term impact;[26]

(2) Reclamation would begin 2 years after the initial disturbance and, once initiated, would continue simultaneously with mining. Reclamation would be completed 7 years after disturbance. Each facility site would require approximately 150 acres and would not be reclaimed until after the mine had ceased production;[27]

(3) The overburden stockpiles would require 360 acres by the year 2011. This statement assumes that 180 acres are required to stockpile overburden from each pit. Each pit can produce a maximum of 6,000,000 tons annually. Since each mine, at peak

TABLE A1-8

ADDITIONAL DOWNLINE FACILITIES NEEDED TO ACCOMMODATE TOTAL TRAINS IN 1991 AND 2011[a]

SEGMENT	DISTANCE[b] (Miles)	ADDITIONAL FACILITIES NEEDED BY 1991			ADDITIONAL FACILITIES FROM 1991-2011			TOTAL ADDITIONAL FACILITIES		
		SIDINGS	CTC[c] ONLY	SECOND MAINLINE	SIDINGS	CTC ONLY	SECOND MAINLINE	SIDINGS	CTC ONLY	SECOND MAINLINE
WEST										
Miles City/Livingston	255	1	--	--	10	150	--	11	150	--
Livingston/Helena	119	1	3	--	--	--	94	1	3	94
Helena/Missoula	120	4	2	--	--	--	88	4	2	88
Missoula/Sandpoint	216	--	76	--	--	--	--	--	76	--
Sandpoint/Spokane	76	--	--	--	8	76	72	8	76	72
EAST										
Miles City/Terry	78	--	78	--	7	--	--	7	78	--
Terry/Casselton	396	--	458	26	--	--	229		458	255
Casselton/Staples	131	--	--	--	7	214	--	7	214	--
Staples/Superior	152	--	--	--	--	--	--	--	--	--
Staples/Twin Cities	139	--	--	--	--	178	27	--	178	27
Casselton/Twin Cities	258	--	--	--	--	82	--	--	82	--
TOTAL	1,940	6	617	26	32	700	510	38	1,317	536

[a] Source: Peat, Marwick, Mitchell, and Co., Washington, DC, July 28, 1981
[b] The miles of improvements are stated in track miles and, therefore, will differ from the distance by segment
[c] Centralized traffic control

production, is expected to produce between 6 million and 12 million tons annually, two pits would be required;

(4) Thirty acres would be disturbed for each 1 million tons of coal mined.

Relying upon the above referenced data and assumptions, a disturbance and reclamation schedule for each of the five mines was prepared. The schedule then was translated into the acre-years of land use lost as a result of mining (an "acre-year" is the use of 1 acre for 1 year). Thus, if 150 acres were disturbed in 1985, reclaimed in 1987, and returned to their original use in 1992, 1,050 acre-years of production would be lost (150 acres x 7 years). The calculation of acre-years lost, by coal production scenario, is presented in Table A1-9.

TABLE A1-9

LAND TO BE USED FOR MINING, IN CUMULATIVE ACRE-YEARS, 1984-2011[a]

	COAL PRODUCTION SCENARIO		
MINE	LOW	MEDIUM	HIGH
Montco	40,328	40,328	40,328
Mine #2	25,710	26,280	41,310
Mine #3	12,540	17,160	30,360
Mine #4	10,440	14,430	17,580
Mine #5	3,570	6,420	17,580
TOTAL LAND	92,588	104,618	147,158

[a] The total estimated disturbed acreage for all five mines by scenario is: Low, 25,889 acres; Medium, 29,999 acres; High, 31,349 acres

Agricultural land use predominates in the areas likely to be used for mining. This conclusion was determined by overlaying the mine site locations on county land use maps and then measuring the various land use types.[28] Table A1-10 presents the results of that analysis. The total land used for mining would constitute 0.09 percent of the project area's available agricultural land.

The loss of agricultural land would result in a reduction in productivity of approximately $1.4 million. This figure is presented in Table A1-11 and represents the medium mining scenario. Under the high mining scenario, the estimated loss of productivity would be approximately $2.0 million. Under the low mining scenario, the loss would be approximately $1.3 million.

TABLE A1-10

USES OF LAND TO BE USED FOR MINING, CUMULATIVE ACRE-YEARS, 1983-2011

CURRENT LAND USE[a]	COAL PRODUCTION SCENARIO LOW	MEDIUM	HIGH
Grazing Land	91,014	102,840	144,656
Nonirrigated Cropland	370	418	589
Irrigated Cropland	1,204	1,360	1,913
TOTAL LAND	92,588	104,618	147,158

[a] The distribution of land within the mining areas, by use, was determined to be 1.3 percent irrigated cropland, 0.4 percent nonirrigated cropland, and 98.3 percent grazing land. See the text for the current land use derivation.

TABLE A1-11

PRODUCTION LOSS ATTRIBUTABLE TO MINING, 1983-2011
PROPOSED ACTION

PRODUCTION LOSS	AMOUNT
Cumulative Cattle	$ 1,165
Production Crops	275
Loss Total ($000s)[a]	$ 1,440
Percentage of Project Area Production[b]	0.06%

[a] Value of production rates (Montana Department of Agriculture, et al., Montana Agriculture Statistics): Irrigated cropland, $180/acre; Nonirrigated cropland, $70/acre; Grazing land, 45 acres/cow-calf unit, $510/animal

[b] Cash receipts from marketing (1979), $80,464,400 (Montana Department of Agriculture, et al., Montana Agricultural Statistics)

A1.1.4.2 Land Required for Community Growth

The construction of the proposed rail line and the subsequent development of the related mines could add an estimated 6,100 people to the project area by the year 2010 (see the Social and Economic discussion, section 2.0). The distribution of those persons is shown in Table A1-12. Some agricultural land would probably be needed by the affected communities as new residents arrive and as the communities

begin to grow. Table A1-13 presents the total acre-years of production loss due to an expansion in housing, in public facilities, and in commercial and industrial sites. This production loss figure is based on the assumption that each additional 100 persons would contribute to 13 acres of development.[29] Table A1-14 shows the relative distribution of land loss, by scenario.

TABLE A1-12

ALLOCATION OF THE PROJECTED IMPACT POPULATION AMONG PROJECT AREA COMMUNITIES

	POPULATION BY YEAR					
COMMUNITY	1986	1991	1996	2001	2006	2010
Ashland[a]	491	397	808	1,361	1,671	1,762
Birney	85	29	69	106	119	108
Broadus	189	171	428	721	856	909
Colstrip	661	272	565	910	1,105	1,165
Forsyth	198	115	311	544	649	689
Lame Deer	2	8	17	26	27	28
Miles City	353	195	431	704	852	991
Other Project Area	205	99	203	342	403	453
TOTAL	2,184	1,286	2,832	4,714	5,682	6,105

[a] Includes portions of Ashland in both Powder River and Rosebud Counties, and the St. Labre Mission

TABLE A1-13

CUMULATIVE ACRE-YEARS OF LAND REQUIRED FOR THE IMPACT POPULATION, BY COMMUNITY: PROPOSED ACTION

	ACRE-YEARS BY PRODUCTION SCENARIO		
COMMUNITY	LOW	MEDIUM	HIGH
Ashland	3,080	3,615	4,635
Birney	220	260	330
Broadus	1,540	1,805	2,320
Colstrip	2,420	2,840	3,640
Forsyth	1,210	1,420	1,820
Miles City	1,650	1,935	2,480
Reservation	110	130	165
Other	770	905	1,160
TOTAL	11,000	12,910	16,550

TABLE A1-14

LAND-YEARS TO BE USED FOR COMMUNITY GROWTH, BY CURRENT LAND USE

CURRENT LAND USE[a]	CUMULATIVE ACRE-YEARS BY SCENARIO		
	LOW	MEDIUM	HIGH
Grazing Land	10,120	11,875	15,230
Nonirrigated cropland	660	775	990
Irrigated cropland	220	260	330
TOTAL	11,000	12,910	16,550

[a] Current land use in those areas subject to community growth is assumed to be as follows:

Grazing land	92 percent
Nonirrigated cropland	6
Irrigated cropland	2
Total	100 percent

This distribution represents a weighted average of current land use in the three-county project area. See the text for a more detailed discussion of land use data. As noted earlier, some of the land required to provide for the impact population currently may be used for urban rather than for agricultural purposes. To the extent that urban rather than agricultural land is used for community development purposes, the effect on the agricultural sector would be less than shown.

The total of 12,910 acre-years of agricultural land use loss represents approximately 6 percent of the total loss of agricultural land use for the proposed rail line and for the related mines. This figure is a "worst case" analysis, since some community growth inevitably would occur in the established residential and commercial areas. In addition, it was assumed that the available housing in the project area would not accommodate the projected population growth. Because the baseline populations of Custer and Powder River Counties are declining, part of the impact population would offset these declines. If this situation developed, the amount of additional land needed would be reduced.

The impact to agricultural productivity, as a result of land lost to community development, would be small. Table A1-15 presents the distribution of that production loss for the medium coal production scenario. The total production loss under the medium production scenario would be approximately $235,000; under the high production scenario, it would be about $274,000; under the low production scenario, it would be approximately $200,000.

TABLE A1-15

PRODUCTION LOSS DUE TO COMMUNITY GROWTH, 1983-2011
PROPOSED ACTION

Cumulative Cattle	$135
Production Crops	100
Loss Total ($000s)[a]	$235
Percentage of Project Area Production[b]	0.01%

[a] Value of production rates (Montana Department of Agriculture, et al., Montana Agriculture Statistics): Irrigated cropland, $180/acre; Nonirrigated cropland, $70/acre; Grazing land, 45 acres/cow-calf unit, $510/animal

[b] Cash receipts from marketing (1979), $80,464,400 (Montana Department of Agriculture, et al., Montana Agriculture Statistics)

Land use changes for the communities of Colstrip, Forsyth, and Miles City would be neither dramatic nor incompatible with their developmental characteristics--although these communities should receive large shares of the projected population growth. This situation is revealed by the population growth percentages these communities would experience (see Table A1-16). Colstrip is particularly well suited to absorb the population alteration with minimal land use change. Current community development activities associated with the construction of Colstrip electric-generating plants #3 and #4 would provide the capacity to accomodate the replacement population after that construction is completed. Miles City and Forsyth are sufficiently large to be capable of handling land use changes of the magnitude projected, in an orderly, nondisruptive way.

Ashland and Broadus may experience a considerable land use change. This development would be most pronounced in those mine construction years when large, short term population changes occur. The pertinent community development changes would vary somewhat, but not dramatically, by coal production scenario. The difference is one of magnitude and does not involve the distribution of community growth.

TABLE A1-16

PROJECTED IMPACT POPULATION AND POPULATION GROWTH
BY COMMUNITY AND BY COAL PRODUCTION SCENARIO

	IMPACT POPULATION (2010)			PROJECTED TOTAL POPULATION GROWTH, 1980-2010		
COMMUNITY	LOW	MEDIUM	HIGH	LOW	MEDIUM	HIGH
Ashland	1,523	1,762	2,222	136%	153%	186%
Birney	47	108	125	21	65	77
Broadus	715	909	1,064	85	112	133
Colstrip	937	1,165	1,481	(13)	(9)	(4)
Forsyth	534	689	918	17	22	29
Miles City	867	991	1,101	3	4	5
Reservation	40	47	53	58	58	59
Other	363	434	525	(13)	(11)	(9)
TOTAL	5,026	6,105	7,489			

A1.2 TONGUE RIVER ROAD ALTERNATIVE

A1.2.1 Construction

The construction of the Tongue River Road Alternative would result in land use impacts that are similar in nature to those impacts described for the proposed rail line. Both Ashland alignments are included in the alternative route. Land use impacts in the Ashland area would be identical to those described for the proposed rail line.

A1.2.1.1 Acquisition of the Right-of-way

The amount of land that would be acquired for the right-of-way of the Tongue River Road alternative route and that land's existing uses are depicted in Table A1-17. The land is owned by the federal government, by the State of Montana, and by private individuals. Fifty-two property owners would be affected by the acquisition of the right-of-way.

Effects on Agricultural Land

Agriculture is the predominant land use for acreage that would be acquired for the Tongue River Road alternative right-of-way. The route would primarily affect grazing land; however, 17 acres of prime agricultural land would be lost. The acquisition of the right-of-way

would displace some capital improvements that are located wholly or partly within the right-of-way of the alternative (see Table A1-18).

TABLE A1-17

LAND USE LOSSES DUE TO THE RIGHT-OF-WAY
TONGUE RIVER ROAD ALTERNATIVE[a]

CURRENT USE	ASHLAND SE ALIGNMENT	ASHLAND NW ALIGNMENT
Irrigated Cropland	68[b] acres	76[b] acres
Nonirrigated Cropland	135	118
Grazing Land	1,450	1,389
Other Uses	225	258
TOTAL	1,878 acres	1,841 acres

[a] The amount of land in acres that would be taken for the right-of-way was calculated by parcel. Data on land use by parcel were obtained from rancher interviews and county appraiser records.
[b] Seventeen acres of this amount are prime agricultural land.

TABLE A1-18

DISPLACEMENT OF CAPITAL IMPROVEMENTS ON RANCHES
TONGUE RIVER ROAD ALTERNATIVE

EXISTING IMPROVEMENT	ASHLAND SE ALIGNMENT	ASHLAND NW ALIGNMENT
Buildings	1	2
Corrals/Holding Areas	1	1
Wells/Water Tanks	4	3
Irrigation Systems	-0-	-0-
Roads	2	5

Effects on Livestock and Range Research Station Land

The Tongue River Road alternative route would follow the proposed rail line to a point just south of the LARRS. Therefore, the alternative's impact on the station would be identical to that of the proposed railroad.

Effects on Subdivision Land

The Tongue River Road alternative route would traverse the Tranel Subdivision, as would the proposed rail line. In addition, the alter-

native would pass beside the Tongue River Estates. This latter subdivision, consisting of eight houses, is located adjacent to the Tongue River Road, about 1 mile from U.S. Highway 212. The Tongue River Road route would be located between the Tongue River Road and the subdivision, and it would require some subdivision land for the right-of-way.

Effects on Recreation Sites

The Tongue River Road route is equivalent to the proposed rail line in its impact on the Branum Lake Fishing Access Site.

Other Impacts

The Tongue River Road route would displace four houses, a trailer, and the sewage lagoon. Three of the houses and the trailer are occupied. In addition, land belonging to the Miles City Livestock Sales Yard would be acquired for this route.

A1.2.1.2 Severed Parcels

Effects on Agricultural Land

The Tongue River Road alternative would sever parcels of land and would result in a land use loss of 650 acres (see Table A1-19). Of the severed acreage, 32 acres are considered prime agricultural land. Fifty-two property owners, of whom 42 are involved in agriculture, would be affected by severance and could experience impacts to their agricultural operations. These impacts could include: (1) restrictions to the movement of cattle; (2) restrictions to ranchers' access to their property; (3) the displacement of irrigation systems.

TABLE A1-19

LOSS OF LAND USE DUE TO ACCESS RESTRICTION AND PARCEL SIZE REDUCTION
TONGUE RIVER ROAD ALTERNATIVE

CURRENT USE	ASHLAND SE ALIGNMENT	ASHLAND NW ALIGNMENT
Irrigated Cropland	80[a] acres	80[a] acres
Nonirrigated Cropland	101	98
Grazing Land	469	328
TOTAL	650 acres	506 acres

[a] Of this amount, 32 acres are considered prime agricultural land

The potential impacts to agricultural operations generated by the Tongue River Road route are similar to those impacts for the proposed rail line. The problems involving the restriction of cattle movement and of ranchers' access to severed parcels do not differ substantially for either route. Mitigative measures previously suggested for the proposed railroad would similarly apply to the Tongue River Road Alternative.

The potential displacement of existing and planned irrigation systems is presented in Table A1-20. Four existing systems would be disrupted--none would be displaced.

TABLE A1-20

POTENTIAL DISPLACEMENT OF CURRENT AND PLANNED IRRIGATION SYSTEMS
TONGUE RIVER ROAD ALTERNATIVE

Number of Existing Systems Disrupted	4
Number of Existing Systems Displaced[a]	-0-
Number of Planned Systems Disrupted	-0-
Acreage Associated with Displaced Systems:	
Existing	-0-
Planned	-0-
Total	-0-
Productivity Loss ($/yr)[b]	$-0-
Investment Loss ($)[c]	$-0-

[a] Systems displaced are fewer than systems disrupted because mitigative measures can restore the full capability of some systems.

[b] Productivity loss is based on an average yield per acre of irrigated land in 1979 of $180/acre. Average yield per acre is based on data from Montana Department of Agriculture, et al., Montana Agriculture Statistics, Vol. XVIII, County Statistics 1978 and 1979, Montana Department of Agriculture and Montana Crop and Livestock Reporting Service, Helena, December 1980, p. 23.

[c] Investment loss includes only the cost of new irrigation equipment. Land-preparation costs and equipment salvage values are not included in the calculation. The following equipment costs were assumed: Pivot sprinkler--$700/acre; Other system--$300/acre (Steve Vick, Hinebauch's Complete Irrigation, Inc., Glendive, MT, March 24, 1981.

Effect on Agricultural Productivity

Construction of the the Tongue River Road alternative route would impact 42 ranchers along the alignment. This total represents 4 percent of the agriculturalists in the project area. Table A1-21 presents the percentages of ranchers' land removed from production.

Since most area ranchers rely on a combination of deeded land and leased land for their operations, these figures may exaggerate the potential impact.

TABLE A1-21

DISTRIBUTION OF IMPACT BY PERCENT OF RANCHERS' LAND REMOVED FROM PRODUCTION: TONGUE RIVER ROAD ALTERNATIVE

PERCENTAGE OF RANCH LAND REMOVED FROM PRODUCTION[a]	NUMBER OF RANCHERS ASHLAND SE ALIGNMENT	ASHLAND NW ALIGNMENT
Less than 1	17	19
1.1 - 2.5	10	10
2.6 - 5.0	6	6
5.1 - 7.5	1	1
7.6 - 10.0	2	2
10.1 - 12.5	1	1
12.6 - 15.0	2	2
Greater than 15	3	3
TOTAL NUMBER OF RANCHERS	42	44

[a] Based on deeded acres only

The construction of the Tongue River Road Alternative would remove approximately 2,303 acres from agricultural production. The consequent monetary loss would approximate a total of $1.8 million (see Table A1-22). The total monetary loss would be 0.08 percent of the agricultural production value for the project area.

Effects on Livestock and Range Research Station Land

Construction of the Tongue River Road alternative would cross the LARRS in the same location as would the proposed rail line. Therefore, severance impacts to the LARRS would be the same for either route.

Effects on Subdivision Land

A rail line along the Tongue River Road route would sever tracts in the Tranel and Tongue River Estates subdivisions. A number of tracts would be severed by the rail line and could be rendered unusable. However, since most tract boundaries could be readjusted, it is assumed that there would be no parcel loss of subdivision land due to severance. The exception to this assumption is the possible parcel loss discussed for the Ashland NW Alignment.

TABLE A1-22

PRODUCTION LOSS DUE TO RIGHT-OF-WAY ACQUISITION AND PROPERTY SEVERANCE
TONGUE RIVER ROAD ALTERNATIVE

PRODUCTION LOSS	ASHLAND SE ALIGNMENT	ASHLAND NW ALIGNMENT
Cumulative Cattle	$ 586	$ 519
Production Crops	1,166	1,167
Loss Total ($000s)[a]	$1,752	$1,686
Percentage of Project Area Production[b]		0.08%

[a] Value of production rates (Montana Department of Agriculture, et al., Montana Agriculture Statistics): Irrigated cropland, $180/acre; Nonirrigated cropland, $70/acre; Grazing land, 45 acres/cow-calf unit, $510/animal

[b] Cash receipts from marketing (1979): $80,464,400 (Montana Department of Agriculture, et al., Montana Agriculture Statistics)

Effects on Recreation Sites

The Tongue River Road alternative would have the same impact to Branum Lake Fishing Access Site as would the proposed rail line.

Other Impacts

The Tongue River Road alternative would have the same impact to the Miles City Livestock Sales Yard as would the proposed rail line.

A1.2.1.3 Acquisition of Borrow Sites

Construction of the Tongue River Road alternative route would require extraction of ballast and sub-ballast from the same number of borrow sites as would the proposed rail line. If the Ashland NW Alignment were included, additional sub-ballast, not available from the right-of-way, would be needed.

A1.2.1.4 Effects of Construction Workers on Land Use

The employment projections for construction of the Tongue River Road route are comparable to those for the proposed rail line. Therefore, the impacts of the construction employment for this route would be the same as those impacts described for the proposed rail line.

A1.2.1.5 Acquisition of Facilities Areas

The terminal points for the Tongue River Road route are the same as those for the proposed railroad. Thus, the same facilities options previously discussed apply to both actions.

A1.2.1.6 Mitigative Measures

The mitigative measures outlined in that section addressing the proposed railroad apply specifically to the Tongue River Road alternative route.

A1.2.2 Operation and Maintenance

The operation and maintenance of the Tongue River Road alternative route could result in trains blocking crossings, thus interfering with access to property. The operation and maintenance activities also could reduce the desirability of property adjoining the rail line. Operational problems associated with this alternative rail line would be experienced by the agricultural sector, by the staff of the Department of Agriculture's Livestock and Range Research Station, by the users of recreation areas, and by the residents of subdivisions.

A1.2.2.1 Effects on Agricultural Operations

Interference with Access

The probability of delay at a railroad/road crossing for the Tongue River Road alternative railroad is the same as that probability discussed for the proposed railroad.

Reduction in Desirability of Ranching Property

The possibility that ranching property could be less desirable because of the operation of a railroad along the Tongue River Road route is the same as that possibilty for property along the proposed route.

Other Impacts

Other impacts resulting from the operation and maintenance of a railroad on the Tongue River Road route--the reluctance of cattle to use cattle passes, fire, coal dust, trespass, and weed propagation--are the same as those impacts for operation and maintenance activities on the proposed railroad route. The relevant mitigative procedures similarly can be applied.

A1.2.2.2 Effects on Livestock and Range Research Station

The Tongue River Road route joins the proposed rail line south of the LARRS. Therefore, impacts to the research station are the same as those impacts previously discussed for the proposed railroad.

A1.2.2.3 Effects on Recreation Areas and Subdivisions

Interference with Access

The Tongue River Road alignment is equivalent to the proposed rail line in relationship to the Spotted Eagle Lake Recreation Area and to the Branum Lake Fishing Access Site.

The Tongue River Road route would follow alignments equivalent to those of the proposed rail line through the Tranel Subdivision and adjacent to the Trusler Subdivision. In addition, this alternative would pass adjacent to the Tongue River Estates. As a result, residents of that subdivision would experience some access delays.

Other Impacts

The Tongue River Road alternative route would follow the same alignment as would the proposed rail line adjacent to the Spotted Eagle Recreation Area, and through the Branum Lake Fishing Access Site, the Tranel Subdivision, and the Trusler Subdivision. It would affect the land uses of these recreation areas and subdivisions with aesthetic and noise disruption in the same manner as described earlier for the proposed railroad. In addition, the Tongue River Road route would pass adjacent to the Tongue River Estates and create some noise and visual intrusion for residents.

A1.2.3 Operations Downline

A railroad operating on the Tongue River Road route would serve the same downline terminal points as would the proposed railroad. Therefore, downline operations and downline impacts would be the same for a railroad operating on either alignment.

A1.2.4 Related Actions

A railroad operating on the Tongue River Road route would serve the same potential coal mines as would the proposed railroad. Therefore, impacts from these related actions would be identical for both alignments.

A1.3 MOON CREEK ALTERNATIVE

A1.3.1 Construction

The construction of the Moon Creek alternative route would result in land use impacts that are similar in nature to those impacts discussed for the proposed rail line.

A1.3.1.1 Acquisition of the Right-of-way

The amount of land that would be acquired for the right-of-way of the Moon Creek route and the land's existing uses are depicted in Table A1-23. The land is owned by the federal government, by the state of Montana, and by private individuals. Forty-one property owners would be affected by the acquisition of the right-of-way.

TABLE A1-23

LAND USE LOSSES DUE TO THE RIGHT-OF-WAY
MOON CREEK ALTERNATIVE[a]

CURRENT USE	ASHLAND SE ALIGNMENT	ASHLAND NW ALIGNMENT
Irrigated Cropland	40	48
Nonirrigated Cropland	77	60
Grazing Land	1,600	1,539
Other Uses	100	133
TOTAL	1,817	1,780

[a]The amount of land in acres that would be taken for the right-of-way was calculated by parcel. Data on land use by parcel were obtained from rancher interviews and county appraiser records.

Effects on Agricultural Land

Agriculture is the predominant land use for acreage that would be acquired for the Moon Creek right-of-way. The alternative route would primarily affect grazing land. The acquisition of the right-of-way would displace some capital improvements that are located wholly or partly within the right-of-way (see Table A1-24).

TABLE A1-24

DISPLACEMENT OF CAPITAL IMPROVEMENTS ON RANCHES
MOON CREEK ALTERNATIVE

EXISTING IMPROVEMENT	ASHLAND SE ALIGNMENT	ASHLAND NW ALIGNMENT
Buildings	1	2
Corrals/Holding Areas	3	3
Wells/Water Tanks	4	3
Irrigation Systems	3	3
Roads	4	7

Effects on Livestock and Range Research Station Land

The right-of-way of the Moon Creek alternative route would require 0.1 percent of the total acreage of the LARRS, or 51 acres. The land taken by this alternative is considered less valuable for research because it is relatively abundant on the station. The Moon Creek route would have no impact to plant research areas and would only take land from two pastures, the Moon Creek and Sadie Flat pastures. The pastures affected by the Moon Creek route are used primarily in conjunction with livestock research projects. The small changes in pasture size are no greater than changes routinely made by staff to provide for changes in research activity. At worst, the reduction in pasture area would cause a small reduction in herd size. Pasture boundaries could be realigned to compensate for land lost to the railroad right-of-way.

Effects on Tranel Subdivision Land

The Moon Creek alternative route would follow the same alignment through the Tranel Subdivision as would the proposed rail line, and it would exert the same impact as would the proposed rail line.

Effects on Recreation Sites

The right-of-way for the Moon Creek route does not affect any land from the Branum Lake Fishing Access Site or any other recreation site.

Other Impacts

Construction of the Moon Creek alternative route would displace one occupied residence and, assuming the Ashland NW Alignment, two or three trailers.

A1.3.1.2 Severed Parcels

Effects on Agricultural Land

The Moon Creek alternative would sever parcels of land and would result in a land use loss of 1,100 acres (see Table A1-25). Forty-one property owners, of which 37 are involved in agriculture, would be affected by the severance and could experience impacts to their agricultural operations. These impacts could include restrictions to the movement of cattle, restrictions to rancher access, and the displacement of irrigation systems.

The potential impacts to agricultural operations generated by the Moon Creek route are similar to those impacts for the proposed rail line. The problems involving restrictions to cattle movement and rancher access to severed parcels would not differ substantially with either route. Mitigative measures previously suggested for the proposed railroad similarly apply to the Moon Creek route.

TABLE A1-25

LOSS OF LAND DUE TO ACCESS RESTRICTION AND PARCEL SIZE REDUCTION
MOON CREEK ALTERNATIVE

CURRENT LAND USE	ASHLAND SE ALIGNMENT	ASHLAND NW ALIGNMENT
Irrigated Cropland	48 acres	48 acres
Nonirrigated Cropland	80	77
Grazing Land	972	831
TOTAL	1,100 acres	956 acres

The potential displacement of existing and planned irrigation systems is presented in Table A1-26. A total of nine existing systems and two planned systems would be impacted. A total of 405 acres could be affected.

TABLE A1-26

POTENTIAL DISPLACEMENT OF CURRENT AND PLANNED IRRIGATION SYSTEMS
MOON CREEK ALTERNATIVE

Number of Existing Systems Disrupted	6
Number of Existing Systems Displaced[a]	3
Number of Planned Systems Disrupted	2
Acreage Associated with Displaced Systems:	
Existing	255
Planned	150
Total	405
Productivity Loss ($/yr)[b]	$ 72,900
Investment Loss ($)[c]	$178,500

[a] Systems displaced are fewer than systems disrupted because mitigative measures can restore the full capability of some systems.

[b] Productivity loss is based on an average yield per acre of irrigated land in 1979 of $180/acre. Average yield per acre is based on data from Montana Department of Agriculture, et al., Montana Agriculture Statistics, Vol. XVIII, County Statistics 1978 and 1979, Montana Department of Agriculture and Montana Crop and Livestock Reporting Service, Helena, December 1980, p. 23.

[c] Investment loss includes only the cost of new irrigation equipment. Land preparation costs and equipment salvage values are not included in the calculation. The following equipment costs were assumed: Pivot sprinkler--$700/acre; Other system--$300/acre (Steve Vick, Hinebauch's Complete Irrigation, Inc., Glendive, MT, March 24, 1981.

Effect on Agricultural Productivity

The Moon Creek alternative would impact 37 ranchers along the alignment. This total represents 3 percent of the agriculturalists in the project area. Table A1-27 presents the percentage of ranchers' land removed from production. Since most area ranchers rely upon a combination of deeded and leased land for their operations, these figures may exaggerate the potential impact.

TABLE A1-27

DISTRIBUTION OF IMPACT BY PERCENT OF RANCHERS' LAND REMOVED FROM PRODUCTION: MOON CREEK ALTERNATIVE

PERCENTAGE OF RANCH LAND REMOVED FROM PRODUCTION[a]	NUMBER OF RANCHERS ASHLAND SE ALIGNMENT	ASHLAND NW ALIGNMENT
Less than 1	15	17
1.1 - 2.5	10	10
2.6 - 5.0	5	5
5.1 - 7.5	3	3
7.6 - 10.0	2	2
10.1 - 12.5	1	1
12.6 - 15.0	1	1
Greater than 15	-0-	-0-
TOTAL NUMBER OF RANCHERS	37	39

[a] Based on deeded acres only

The construction of the Moon Creek alternative would remove approximately 3,222 acres from agricultural production. The consequent monetary loss would approximate $3.5 million (see Table A1-28). The total monetary loss would be 0.16 percent of the agricultural production value for the project area.

Effects on Livestock and Range Research Station Land

Construction of a rail line along the Moon Creek alternative route would cross Moon Creek and Sadie Flats pastures. The rail line could disrupt access by livestock to the pastures. However, construction of grade crossings and grade-separated crossings, which have been agreed to by the TRRC, would prevent the loss of parcels due to severance.

Effects on Subdivision Land

Construction of a rail line along the Moon Creek route would have

TABLE A1-28

PRODUCTION LOSS DUE TO RIGHT-OF-WAY ACQUISITION AND PROPERTY SEVERANCE
MOON CREEK ALTERNATIVE

PRODUCTION LOSS	ASHLAND SE ALIGNMENT	ASHLAND NW ALIGNMENT
Cumulative Cattle	$ 787	$ 720
Production Crops	2,692	2,693
Loss Total ($000s)[a]	$3,479	$3,413
Percentage of Project Area Production[b]		0.16%

[a] Value of production rates (Montana Agriculture Statistics): Irrigated cropland, $180/acre; Nonirrigated cropland, $70/acre; Grazing land, 45 acres/cow-calf unit, $510/animal

[b] Cash receipts from marketing (1979): $80,464,400 (Montana Agriculture Statistics)

the same impact to the Tranel Subdivision as would the proposed rail line.

Effects on Recreation Sites

Construction of the Moon Creek Alternative would not impact the Branum Lake Fishing Access Site.

Other Impacts

The Moon Creek alternative route would not intersect the Miles City Livestock Sales Yard and, therefore, would not cause severance in that area. The alternative route with the Ashland NW Alignment would have the same impact to the urban areas in Ashland as would the proposed rail line.

A1.3.1.3 Acquisition of Borrow Sites

Construction of the Moon Creek Alternative would require the extraction of ballast and sub-ballast from the same number of borrow sites as would the proposed rail line. If the Ashland NW Alignment were included in the alternative, additional sub-ballast, not available from the right-of-way, would be needed.

A1.3.1.4 Effects of Construction Workers on Land Use

The employment projections for construction of the Moon Creek Alternative are comparable to those for the proposed rail line. There-

fore, the impacts of construction employment are the same as those impacts described for the proposed rail line.

A1.3.1.5 Acquisition of Facilities Areas

The terminal points for a railroad operating on the Moon Creek alternative route are the same as those for the proposed railroad. Thus the same facilities options previously discussed for the proposed railroad apply to the Moon Creek alternative.

A1.3.1.6 Mitigative Measures

The mitigative measures outlined in that section addressing the proposed railroad can be applied to the Moon Creek alternative.

A1.3.2 Operation and Maintenance

The operation and maintenance of a railroad on the Moon Creek alternative route could result in trains blocking crossings, thus interfering with access to property. The operation and maintenance activities also could reduce the desirability of property adjoining the rail line. Operational problems associated with this alternative alignment would be experienced by the agricultural sector, by the staff of the LARRS, by the users of recreation areas, and by the residents of subdivisions.

A1.3.2.1 Effects on Agricultural Operations

Interference with Access

The probability of delay at a railroad/road crossing for the Moon Creek alternative is the same as that probability discussed for the proposed railroad.

Reduction in Desirability of Ranching Property

The possibility that ranching property could become less desirable because of the operation of a railroad along the Moon Creek route is the same as that possibilty for property along the proposed route.

Other Impacts

Other impacts resulting from the operation and maintenance of a railroad on the Moon Creek route--the reluctance of cattle to use cattle passes, fire, coal dust, trespass, and weed propagation--are the same as those impacts for operation and maintenance activities on the proposed railroad. The relevant mitigative procedures similarly can be applied.

A1.3.2.2 Effects on Livestock and Range Research Station

The impact of a railroad operating on the Moon Creek alternative route varies from the impact described for the proposed railroad. The Moon Creek route does not cross any plant research areas and thus would have no impact to those areas. Livestock research involving Sadie Flat and Moon Creek pastures could be disrupted. Pasture vegetation and livestock could be affected because of "spillover" from the railroad's vegetation control measures.

Fires, surface flow modification, and subtle and unforseen changes also could affect the livestock research conducted along the Moon Creek alternative. The magnitude of impact would not be as large for the Moon Creek route because the livestock research is mobile and land for this research is more plentiful. If it was determined that vegetation changes adjacent to the track threaten a particular research project, the affected area could be fenced off to prevent grazing.

The railroad also might affect pastures located along the Moon Creek route by changing grazing patterns. Grazing pressures are likely to increase along new fence lines, around cattle passes, and along trails to cattle passes and to routes for water. Overall carrying capacity of the pastures should not change significantly. The primary problem would be distributing livestock to obtain maximum benefit for the pasture.

The overall disturbance to research projects located along the Moon Creek alternative would be minimal, as would the effect of the alternative on the operations and future capability of LARRS. Mitigation of these impacts has been discussed in the previous section on the proposed railroad.

A1.3.2.3 Effects on Subdivisions and Recreation Areas

The Moon Creek route would affect the Tranel and Trusler Subdivisions in the same way as would the proposed railroad. However, it would not impact the Branum Lake Fishing Access Site. Visual and noise impacts to the Spotted Eagle Recreation Area would be less under this alternative route than under the proposed railroad route.

A1.3.3 Operations Downline

Trains operating on the Moon Creek route would serve the same downline terminal points as would the proposed railroad. Therefore, downline operations and downline impacts would be the same for a railroad operating on either alignment.

A1.3.4 Related Actions

Trains operating on the Moon Creek alternative route would serve the same potential coal mines as would the proposed railroad. There-

fore, impacts from these related actions would be identical for both alignments.

A1.4 COLSTRIP ALTERNATIVE

A1.4.1 Construction

The construction of the Colstrip alternative route would result in land use impacts that are similar in nature to those impacts generated by the proposed rail line, including either alignment near Ashland.

A1.4.1.1 Acquisition of the Right-of-way

The amount of land that would be acquired for the right-of-way of the Colstrip route and that land's existing uses are depicted in Table A1-29. The land is owned by the federal government, by the State of Montana, and by private individuals. Thirty landowners would be affected by the acquisition of the right-of-way.

TABLE A1-29

LAND USE LOSSES DUE TO THE RIGHT-OF-WAY
COLSTRIP ALTERNATIVE[a]

CURRENT USE	ASHLAND SE ALIGNMENT	ASHLAND NW ALIGNMENT
Irrigated Cropland	5	13
Nonirrigated Cropland	65	48
Grazing land	970	909
Other Uses	70	103
TOTAL	1,110	1,073

[a] The amount of land in acres that would be taken for the right-of-way was calculated by parcel. Data on land use by parcel were obtained from rancher interviews and county appraiser records.

Effects on Agricultural Land

Agriculture is the predominant land use for acreage that would be acquired for the Colstrip route. The alternative primarily would affect grazing land. The acquisition of the right-of-way would displace some capital improvements that are located wholly or partly within the right-of-way (see Table A1-30). The number of displaced items would not be large, however, and most of these improvements readily could be relocated. Although the costs to most ranchers would

be small, in some cases the costs could be significant, because corrals and roads would be displaced.

TABLE A1-30

DISPLACEMENT OF CAPITAL IMPROVEMENTS ON RANCHES
COLSTRIP ALTERNATIVE

EXISTING IMPROVEMENT	ASHLAND SE ALIGNMENT	ASHLAND NW ALIGNMENT
Buildings	1	2
Corrals/Holding Areas	5	5
Wells/Water Tanks	4	3
Irrigation Systems	-0-	-0-
Roads	1	4

Effects on Livestock and Range Research Station Land

The Colstrip alternative route would not cross the LARRS and therefore would not impact that research facility.

Effects on Subdivision Land

The Colstrip alternative would follow the same alignment through the Tranel Subdivision as would the proposed rail line, and it would exert the same impact as would the proposed rail line.

Effects on Recreation Sites

Construction of a rail line along the Colstrip alternative route would not impact Branum Lake Fishing Access Site.

Other Impacts

The Colstrip Alternative would displace one occupied house, and, assuming the Ashland NW Alignment, two or three trailers.

A1.4.1.2 Severed Parcels

Effects on Agricultural Land

The Colstrip Alternative would sever parcels of land and result in a land use loss of 585 acres (see Table A1-31). Thirty property owners (26 of whom are involved in agriculture) would be affected by severance and could experience impacts to their agricultural operations. These impacts could include: (1) restriction to the movement

of cattle; (2) restrictions to ranchers' access to their property; and (3) the displacement of irrigation systems.

TABLE A1-31

LOSS OF LAND USE DUE TO ACCESS RESTRICTIONS AND PARCEL SIZE REDUCTION COLSTRIP ALTERNATIVE

CURRENT LAND USE	ASHLAND SE ALIGNMENT	ASHLAND NW ALIGNMENT
Irrigated Cropland	13	13
Nonirrigated Cropland	53	50
Grazing Land	519	378
TOTAL	585	441

The potential impacts to agricultural operations produced by the Colstrip alternative are similar to those impacts for the proposed rail line. The problems involving the restrictions of cattle movement and of rancher access to severed parcels do not differ substantially from the proposed rail line. Mitigative measures previously suggested for the proposed rail line similarly apply to the Colstrip alternative. The potential disruption of existing irrigation systems is presented in Table A1-32.

Effect on Agricultural Productivity

The Colstrip alternative would impact 26 ranchers in the project area. This total represents 2 percent of the agriculturalists in the project area (see Table A1-33). Since most area ranchers rely on a combination of deeded land and leased land for their operations, these figures may exaggerate the potential impact.

The construction of the Colstrip Alternative would remove approximately 1,625 acres from agricultural production. The consequent monetary loss would approximate a total of $761,000 (see Table A1-34).

Effects on Livestock and Range Research Station Land

Construction of a rail line along the Colstrip alternative route would not cross the LARRS and, therefore, would not sever parcels in that area.

Effects on Subdivision Land

Construction of the Colstrip alternative route would impact the Tranel Subdivision in a similar manner as would the proposed rail line.

TABLE A1-32

POTENTIAL DISPLACEMENT OF CURRENT AND PLANNED IRRIGATION SYSTEMS
COLSTRIP ALTERNATIVE

Number of Existing Systems Disrupted		2
Number of Existing Systems Displaced[a]		-0-
Number of Planned Systems Disrupted		-0-
Acreage Associated with Displaced Systems:		
Existing		-0-
Planned		-0-
Total		-0-
Productivity Loss ($/year)[b]	$	-0-
Investment Loss ($)[c]	$	-0-

[a]Systems displaced are fewer than systems disrupted because mitigation measures can restore the full capability of some systems.

[b] Productivity loss is based on an average yield per acre of irrigated land in 1979 of $180/acre. Average yield per acre is based on data from Montana Department of Agriculture, et al., Montana Agriculture Statistics, Vol. XVIII, County Statistics 1978 and 1979, Montana Department of Agriculture and Montana Crop and Livestock Reporting Service, Helena, December 1980, p. 23.

[c] Investment loss includes only the cost of new irrigation equipment. Land-preparation costs and equipment salvage values are not included in the calculation. The following equipment costs were assumed: Pivot sprinkler--$700/acre; Other system--$300/acre (Steve Vick, Hinebauch's Complete Irrigation, Inc., Glendive, MT, March 24, 1981.

Effects on Recreation Sites

The Colstrip alternative route would not cross the Branum Lake Fishing Access Site and, therefore, would not impact that facility.

Other Impacts

Construction of the Colstrip alternative route would not impact the Miles City Livestock Sales Yard. The alternative route with the Ashland NW Alignment would have the same impacts to urban areas as would the proposed rail line.

A1.4.1.3 Acquisition of Borrow Sites

Construction of the Colstrip alternative route would require ballast from established borrow areas in northern Wyoming and South

TABLE A1-33

DISTRIBUTION OF IMPACT BY PERCENT OF RANCHERS' LAND REMOVED FROM PRODUCTION: COLSTRIP ALTERNATIVE

PERCENTAGE OF RANCH LAND REMOVED FROM PRODUCTION[a]	NUMBER OF RANCHERS ASHLAND SE ALIGNMENT	ASHLAND NW ALIGNMENT
Less than 1	10	12
1.1 - 2.5	7	7
2.6 - 5.0	2	2
5.1 - 7.5	2	2
7.6 - 10.0	2	2
10.0 - 12.5	2	2
12.6 - 15.0	1	1
Greater than 15	-0-	-0-
TOTAL NUMBER OF RANCHERS	26	28

[a] Based on deeded acres only

TABLE A1-34

PRODUCTION LOSS DUE TO RIGHT-OF-WAY ACQUISITION AND PROPERTY SEVERANCE COLSTRIP ALTERNATIVE

PRODUCTION LOSS	ASHLAND NW ALIGNMENT	ASHLAND SE ALIGNMENT
Cumulative Cattle	$ 450	$ 383
Production Crops	311	312
Loss Total ($000s)[a]	$ 761	$ 695
Percentage of Project Area Production[b]		0.06%

[a] Value of production rates (Montana Department of Agriculture, et al., Montana Agriculture Statistics): Irrigated cropland, $180/acre; Nonirrigated cropland, $70/acre; Grazing land, 45 acres/cow-calf unit, $510/animal

[b] Cash receipts from marketing (1979): $80,464,400 (Montana Department of Agriculture, et al., Montana Agriculture Statistics)

Dakota. Two or three new borrow areas would be needed for sub-ballast and, under the Ashland NW Alignment, additional sub-ballast material would be needed.

A1.4.1.4 Effects of Construction Workers on Land Use

The projected construction employment for the Colstrip alternative differs slightly from that for the proposed railroad. An average of 160 workers would be needed during the first 2.5 years of construction. Peak employment would be 487. Construction of the rail line to Terminal Point #2 would require the same number of workers as would the proposed railroad. Due to the lower construction work force, fewer acres would be required for construction workers on the lower induced population.

A1.4.1.5 Acquisition of Facilities Areas

The Colstrip alternative route would terminate at the Burlington Northern facilities in Colstrip. Construction of this alternative route would necessitate the building of a new interchange yard at Colstrip. The size of the yard has not been determined, nor has a site been evaluated. The 2-acre facility at Ashland still would be required, and the accompanying impacts to the community are the same impacts as those for the proposed rail line.

A1.4.1.6. Mitigative Measures

The mitigative measures outlined in that section addressing the proposed rail line apply directly to the Colstrip alternative.

A1.4.2 Operation and Maintenance

The operation and maintenance of a railroad along the Colstrip route could result in trains blocking crossings, thus interfering with access to property. The operation and maintenance activities also could reduce the desirability of property adjoining the rail line. Operational problems associated with the Colstrip alternative route would be experienced by the agricultural sector and by the residents of some nearby subdivisions.

A1.4.2.1 Effects on Agricultural Operations

Interference with Access

Trains operating along the Colstrip alternative would move more slowly than trains along the other possible routes. The average speed would be 32 mph. Consequently, the probability of delay would be more frequent, averaging 5 to 7 percent, and each delay would average 1.6 minutes.

Reduction in Desirability of Ranching Property

The possibility that agricultural property adjacent to the Colstrip route could be less desirable because of the operation of trains is the same as that possibility for property along the proposed rail line.

Other Impacts

Other land use impacts resulting from the operation and maintenance of a railroad along the Colstrip alternative--the reluctance of cattle to use cattle passes, fire, coal dust, trespass, and weed propagation--are similar to those impacts for operation and maintenance activities discussed for the proposed rail line. The relevant mitigative measures similarly can be applied.

A1.4.2.2 Effects on Livestock and Range Research Station

The Colstrip alternative route would not cross the LARRS and would not impact that facility.

A1.4.2.3 Effects on Recreation Areas and Subdivisions

The Colstrip alternative route is located neither in the vicinity of the Spotted Eagle Recreation Area nor the Branum Lake Fishing Access Site. The Colstrip route, however, would cause more access delays at the Spotted Eagle Recreation Area than would the proposed rail line. This effect would occur because more TRRC eastbound (versus westbound) trains would be routed on that portion of the Burlington Northern mainline adjacent to the recreation area. The percentage of trips delayed for the recreation area entrance, under the Colstrip Alternative, is double the percentage for the proposed rail line.

Since the Colstrip alternative is located in the vicinity of neither the Spotted Eagle Recreation Area nor the Branum Lake Fishing Access Site, this alternative would exert no visual and noise impacts upon the two sites. The alternative follows the same alignment through the Tranel Subdivision and adjacent to the Trusler Subdivision as does the proposed rail line. Thus, the noise and visual impacts attributable to the Colstrip alternative route are the same as those impacts described for the proposed rail line.

A1.4.3 Operations Downline

The Colstrip alternative route's downline corridors are the same as those for the proposed rail line. Therefore, downline operations and downline impacts would be the same for trains operating on either route.

A1.4.4 Related Actions

Trains operating on the Colstrip alternative route would serve the same potential coal mines as would those operating on the proposed rail line. Colstrip would receive a slightly higher impact population under this alternative (see Tables A1-35 through A1-38).

TABLE A1-35

ALLOCATION OF PROJECTED IMPACT POPULATION
AMONG PROJECT AREA COMMUNITIES
(COLSTRIP ALTERNATIVE/MEDIUM PRODUCTION SCENARIO)

	POPULATION BY YEAR					
COMMUNITY	1986	1991	1996	2001	2006	2010
Ashland[a]	201	452	815	1,295	1,558	1,762
Birney	17	29	64	95	112	108
Broadus	88	186	418	689	813	909
Colstrip	620	376	771	1,164	1,411	1,433
Forsyth	60	180	465	754	910	960
Lame Deer	2	8	17	26	27	28
Miles City	209	55	126	225	288	236
Other Project Area	421	80	196	357	405	350
TOTAL	1,618	1,366	2,872	4,605	5,524	5,786

[a]Includes portions of Ashland in both Powder River and Rosebud Counties, and the St. Labre Mission

TABLE A1-36

CUMULATIVE ACRE-YEARS OF LAND REQUIRED
FOR THE IMPACT POPULATION, BY COMMUNITY
COLSTRIP ALTERNATIVE

	ACRE-YEARS BY SCENARIO		
COMMUNITY	LOW	MEDIUM	HIGH
Ashland	3,080	3,615	4,635
Birney	220	260	330
Broadus	1,540	1,805	2,320
Colstrip	3,085	3,615	4,635
Forsyth	1,650	1,940	2,480
Miles City	550	645	830
Reservation	110	130	165
Other	770	905	1,160
TOTAL	11,005	12,915	16,555

TABLE A1-37

LAND-YEARS TO BE USED FOR COMMUNITY GROWTH, BY CURRENT LAND USE
COLSTRIP ALTERNATIVE

CURRENT LAND USE[a]	CUMULATIVE ACRE-YEARS BY SCENARIO		
	LOW	MEDIUM	HIGH
Grazing Land	10,125	11,880	15,235
Nonirrigated cropland	660	775	990
Irrigated cropland	220	260	330
TOTAL	11,005	12,915	16,555

[a] Current land use in those areas subject to community growth is assumed to be as follows:

Grazing land	92%
Nonirrigated cropland	6
Irrigated cropland	2
Total	100%

This distribution represents a weighted average of current land use in the three-county project area. See the text for a more detailed discussion of land-use data. As noted earlier, some of the land required to provide for the impact population currently may be used for urban rather than for agricultural purposes. To the extent that urban rather than agricultural land is used for community development purposes, the effect on the agricultural sector would be less than shown.

TABLE A1-38

PRODUCTION LOSS DUE TO COMMUNITY GROWTH, 1983-2011
(COLSTRIP ALTERNATIVE/MEDIUM PRODUCTION SCENARIO)

Cumulative Cattle	$135
Production Crops	100
Loss Total ($000s)[a]	$235
Percentage of Project Area Production[b]	0.01%

[a] Value of production rates (Montana Department of Agriculture, et al., Montana Agriculture Statistics): Irrigated cropland, $180/acre; Nonirrigated cropland, $70/acre; Grazing land, 45 acres/cow-calf unit, $510/animal

[b] Cash receipts from marketing (1979), $80,464,400 (Montana Department of Agriculture, et al., Montana Agriculture Statistics)

A1.5 FOOTNOTES

1. Additional displacement could occur if proximity to a rail line would disrupt use of the improvement. Improvements located adjacent to the rail line are not included in the count of displaced improvements because the degree to which they can be disrupted is not apparent.

2. Joe C. Elliot, "Impacts of Tongue River Railroad Alignment Option E on the Livestock and Range Research Station," prepared for Tongue River Railroad Environmental Impact Statement, Helena, Montana, 1982.

3. L. Dean Culwell, "Impact Report on LARRS," prepared for the Tongue River Railroad Company, prepared by Western Technology and Engineering, Inc., Helena, Montana, 1981-82.

4. Al Elser, Montana Department of Fish, Wildlife, and Parks, personal communication.

5. Ibid.

6. To determine the extent of this type of potential land use loss, the following assumptions were established:

(1) The railroad will provide equipment and livestock crossings or underpasses adequately sized and spaced to suit each ranch's operating requirements within reason. Only topography was considered a constraint to this assumption. (Actual size and location of crossings and underpasses will be determined during negotiation between the TRRC and ranchers.)
(2) Cattle passes are effective in providing access between parcels of land except in unique cases. Used on a daily basis, cattle become accustomed to cattle passes and use them with little, if any, reluctance. Used on a periodic or seasonal basis, cattle often are reluctant to use cattle passes. Consequently, additional resources (labor, time, and holding pens) would be required to herd cattle through cattle passes, but access to parcels separated by the rail line would be maintained.
(3) A parcel must be at least 25 acres and not too irregularly shaped for it to be economically cultivated.
(4) A parcel must be at least 200 acres for it to be economically used as an independent pasture. The exception is a pasture divided into two parts, but connected with a cattle pass to allow daily movement of cattle between the parts. In this case, the minimum parcel size is 25 acres.

The above criteria are based on interviews with Sarpy Creek and Gillette/Orin ranchers, Tongue River area ranchers, Ft. Keogh personnel, and Montana Department of Agriculture personnel. The assumptions

on parcel size are consistent with current land use practice in the Tongue River area. Using these assumptions, a parcel-by-parcel examination of each ranch was performed. The land use characteristics of each ranch (described in Footnote 10) provided the requisite data base. The results were recorded by ranch and by current land use. Plans for upgrading land uses also were recorded.

7. The interviews with ranchers in the study area whose property would be affected by the rail line defined the relevant issues to be discussed. Based on this information and on the experience with railroad operations elsewhere, conclusions regarding the potential ranching impacts were developed. The information pertaining to the experience with railroad operations elsewhere was derived from a variety of sources. One source of information was interviews conducted with ranchers on whose property a rail line or other right-of-way--e.g., interstate highway--is now located. Ranchers with property located on the Colstrip, Sarpy Creek, and Gillette/Orin rail lines and on Interstate 94 in southeastern Montana were interviewed. Eleven ranchers were interviewed on the Gillette/Orin line, and nine on the other rail lines and on the interstate highway. The actual experience of these ranchers with the construction and operation of a rail line primarily used to transport coal provided a basis for evaluating the nature and magnitude of potential TRRC impacts on ranching.

8. Ibid.

9. Refer to section A3.0, Transportation.

10. The methods used to determine the effect on ranching involved the development of an extensive data base characterizing ranching operations in the impacted area. A list of ranches on which one or more of the routes would be located was prepared. For each ranch, the land use by parcel and land use interrelationships were defined, using the rancher interviews. Seventy percent of ranchers on whose property a rail line is located were interviewed. The interview information was documented in a narrative interview summary and on a map. This documentation was sent to each respective interviewee for review. Information on the other ranches, the owners of which were not interviewed, was obtained from county appraisers' records. Appraisers' data was compared to data on land use obtained directly from ranchers. The variance in the two kinds of data was found to be less than 6 percent. The interview and county appraisers' data provided the detailed land use information needed to assess the potential affects of the rail line on ranching property.

11. For a detailed account of construction employment, see the section on Economic and Social Concerns (A2.0) and for an explanation of how figures were determined, see the description of the BREAM model.

12. The method used in estimating crossing delays is described in the section on Transportation. The calculation used to determine crossing delays here follows:

Calculation for Probability of Delay for TRRC Mainline:

$$P = \frac{[ADTT] \times [L/S) = (.025)]}{24}$$

Where P = probability of delay
ADTT = average daily train traffic (4-7 trains in 1990, 19-25 in 2011)
L = train length (1.12 miles)
S = train speed (32-38 mph)
.025 = delay prior to train arrival at the crossing (hours)
24 = hours per day

Peat, Marwick, Mitchell, and Company, Washington, DC, May 1981. Calculations were developed through the use of a train performance calculator which simulates train operations.

13. The method used in estimating crossing delays at sidings is described in the section on Transportation. The calculation used to determine crossing delays here follows:

Calculation for Crossing Delays:

$$P = \frac{[ADTT] \times [(D) + (L/S) + (.025)]}{24}$$

Where P = probability of delay
ADTT = average daily train traffic (4-7 trains in 1990, 19-25 in 2011).
D = delay per train per siding per day (5 minutes in 1990, 17 minutes in 2011)
L = train length (1.12 miles)
S = train speed (10 mph)
.025 = delay prior to train arrival at the siding crossing
24 = hours per day

Calculation for Percentage of Mileage:

$$\text{Colstrip} = \frac{(2 \text{ sidings; total } 23{,}000^{1})}{(\text{track length of } 48 \text{ miles})}$$

$$\text{Other routes} = \frac{(4 \text{ sidings; total } 59{,}000^{1})}{(\text{track length of } 88 \text{ miles})}$$

14. These findings are based on interviews conducted with ranchers who have property located on the Colstrip, Sarpy Creek, and Gillette/Orin rail lines and on Interstate Highway 94 in southeastern Montana.

15. Lyman, Chief (retired), Miles City Fire Department, interview, January 28, 1981; and Martin, Chief, Miles City Fire Department, interview, September 1, 1981.

16. The assumptions in the calculation of the 10-acre figure are: 3.5 fires annually x 2.5 acres damaged per fire. The calculation of the frequency of grass fires along the TRRC right-of-way is based on the Proposed Action/Medium Production Scenario combination. From 1985-2011, TRRC trains will accumulate 8.5 million train miles. At one fire per 50,000 to 170,000 train miles, the estimate of from two to six fires per year was calculated.

17. U.S. Department of Transportation, "Proposed Final Environmental Impact Statement - Coal Line Project," 1981; and U.S. Department of Interior and Montana Department of State Lands, "Final Environmental Statement - Northern Powder River Basin Coal, Montana," 1980.

18. J. Olson, Montana Air Quality Bureau, Helena, Montana, personal communication, May 22, 1981.

19. Interviews with ranchers owning property on the Colstrip, Sarpy Creek, and Gillette/Orin rail lines and on Interstate Highway 94 in southeastern Montana.

20. Ibid.

21. Joe C. Elliot, consultant, Letter to Alan Newell, July 23, 1982; see also Ronald D. Tabler, "Geometry and Density of Drifts formed by Snowfences," Journal of Glaciology, Vol. 26, No. 94, 1980.

22. For an explanation of the methods used to determine noise impacts, see the section on Noise Impacts (A6.0).

23. John H. Armstrong, The Railroad--What It Is, What It Does (Omaha, Nebraska: Simmons-Boardman Publishing Corporation, May, 1978), p. 30.

24. Measurements taken from maps of various downline communities.

25. As noted in Chapter 3, the approach used to estimate tonnage levels included a review of current literature.

26. Montana Department of State Lands and U.S. Department of the Interior, Office of Surface Mining Reclamation and Enforcement, in cooperation with the U.S. Geological Survey and the Montana Bureau of Mines and Geology, "Final Tongue River, Montana, Petition Document," Helena, Montana and Washington, D.C., 1982.

27. Brace Hayden and Gary Lynch, Montana Department of State Lands, Helena, Montana, interview, June 25, 1981.

28. Current land use maps of Custer County, Powder River County, and Rosebud County, Yellowstone-Tongue A.P.O., Broadus, Montana, 1978.

29. Factors (acres per 100 persons) were developed for housing, public facilties, and commercial/industrial development associated with population change (see section A2). The summation of the factors is 13 acres per 100 population.